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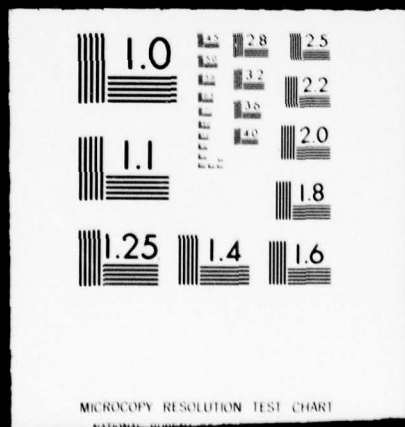
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**USAFETAC-TN-77-2**

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**USAFETAC  
DATSAV DATA BASE  
HANDBOOK**

**DECEMBER 1977**

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AIR WEATHER SERVICE (MAC)**

**USAF ENVIRONMENTAL  
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## USAFETAC DATSAV DATA BASE HANDBOOK

### Introduction

The Data Base Management Section of the United States Air Force Environmental Technical Applications Center (USAFETAC) prepared this handbook to provide the user of the USAFETAC DATA SAVE (DATSAV) Data Base with specific information on the Surface, Upper-Air, and Aircraft Data Sets maintained by USAFETAC. The DATSAV Data Base consists of worldwide weather observations collected through the USAF Automated Weather Network (AWN), decoded at the Air Force Global Weather Central (AFGWC), Offutt AFB, Nebraska, and stored on magnetic tape at USAFETAC, Scott AFB, Illinois and Operating Location A (USAFETAC,OL-A), Asheville, North Carolina. The data sets are used for climatological applications by USAFETAC at Scott AFB, Illinois and at USAFETAC,OL-A, Asheville, North Carolina. DATSAV refers to the computerized tape format in which decoded weather observations are stored at USAFETAC.

The data sets of DATSAV are designed to maintain as much of the originally encoded meteorological data as possible using the minimum amount of storage. This method is combined with a fixed control section and a mandatory data section to facilitate fast, efficient retrieval of the data.

A short description and background of each data set follows in the next section. The specifics of the file construction and the format of the data appear in the following appendixes to this handbook:

- Appendix A - Surface Data
- Appendix B - Upper-Air Data
- Appendix C - Aircraft Data
- Appendix D - WMO Codes

The USAFETAC Data Automation Branch coordinates with AFGWC and Detachment 7, AFGWC, at Carswell AFB, Texas to keep abreast of current changes in coding practices and the World Meteorological Organization (WMO) procedures. Any questions or comments regarding the data as described in this handbook should be addressed to the Data Base Management Section, USAFETAC (USAFETAC/ADD, Scott AFB, IL 62225) (Autovon 638-4416).

### DATSAV Data Base Description

a. Surface Data Set. The Surface Data Set contains the synoptic, METAR, SMARS, AMOS, AERO, MARS, and airways observations that are received (via the AWN) from worldwide surface reporting stations. As background information, the following brief discussion outlines the method of collection, decode procedures, and daily processing required to build the historical data files.

To fully describe the method of data collection would require a lengthy discussion of the International Meteorological Exchange System and the AWN. Simply stated, however, each of the overseas AWN sites (Fuchu Air Station, Japan; Clark Air Base, Philippine Islands; and RAF Croughton, England) collects data disseminated by various countries over Radio Teletype Transmission (RATT) and Continuous Wave (CW) broadcast. These observations are then transmitted via high-speed circuits to the AWN site at Carswell AFB, Texas. All other data collected by the Carswell AWN site are added to the overseas-collected data and transmitted again via high-speed methods to AFGWC at Offutt AFB, Nebraska, where it is further processed.

Each specific type of data is decoded by appropriate computer programs designed to process various types of weather codes. The decoding process consists of identifying each part of the observation and placing the specific element values into a predetermined disk-storage location. Daily, the disk-storage areas are output to tape for AFGWC use and subsequent transmission to USAFETAC.

AFGWC transmits all surface observations which are received during the day to USAFETAC over the Advanced Research Projects Agency (ARPA) Telecomputer Network (ARPANET). USAFETAC reformats each observation into the DATSAV Surface format and validates the block-station number against the Air Weather Service Master Station Catalog (AWSMSC). All daily receipt files are sorted into station-date-time-group (STAFIL) order. STAFIL tapes are merged into a monthly station-order file, and eventually, into a yearly station-order file.



The evolution of the USAFETAC Surface Data Base is discussed below (see Figure 1, Page 3).

(1) Tape Data Family (TDF) - The first method of data collection and formation of the surface data set required key punching onto computer cards all of the data taken from Weather Bureau, Army, and Navy (WEAN) Forms 10 or other records from foreign countries, surface analyses, and teletype receipt rolls. Weather observations of all types which have been transcribed from source material to punched cards have been grouped into "card decks", homogeneous groups of data, based upon uniqueness of source material, geographical area, card format, or other distinguishing features. The "card decks" have been transferred to magnetic tape and are referred to as Tape Data Families. At present, there are three separate surface TDF files of this type; TDF13, TDF14, and TDF34. The TDF13 files contain synoptic-type data; the TDF14 files contain airways-type observations; and the TDF34 files contain summary-of-the-day airways-type (or 6-hourly summary) observations. In general, TDF files begin in the mid 1950s with some information dating back to the late 30s and early 40s. These files are the most meteorologically pure and inclusive data files available in USAFETAC for climatological use. Since 1 January 1971, only data for the TDF34 files have been key punched onto cards. Analysts wishing to know what TDF data are available should consult the USAFETAC Data Base Management Section.

(2) COLFAC - The Cold Fact (COLFAC) method of data collection came into existence about 1964. Observations were collected on paper-tape rolls from the Air Weather Service (AWS) manual weather relays and on magnetic tapes from automated weather relays throughout the world. The data were processed (placed in a standard format and quality controlled), decoded, and placed into the COLFAC tape format. As the automated weather relays became more sophisticated, paper-tape processing ceased. Beginning in early 1971, only a single daily magnetic tape received from the Carswell AFB, Texas automated relay was being processed under COLFAC. On 13 July 1972, all airways observations were deleted from the daily COLFAC tapes. However, they were reinstated for the period 27 November 1972 through 10 January 1973 due to AFGWC decoder changes. Processing of all surface observations in a COLFAC format ceased as of 1 June 1973.

(3) DATSAV - The DATSAV collection system for surface observations started in January 1971. In the beginning, only those observations which had been decoded by the AFGWC airways decoder were acceptable for USAFETAC use. For this reason the airways observations were deleted from COLFAC in July 1972. In order to insure a complete data base, dual processing of the COLFAC and DATSAV systems continued until 1 June 1973. Subsequent to 1 June 1973, all processing of surface observations has been via the DATSAV system.

(4) USAFETAC Data Base Working File - This working file was established as the result of an agreement with the Advanced Research Project Agency (ARPA) to provide them with a 10-year period of record of worldwide observations. This task required that the data collected by the above-mentioned methods be placed into a single data format. A format compatible with both the Univac Spectra 70/45 Computer at USAFETAC, OL-A, Asheville, North Carolina and the IBM 360/44 Computer at USAFETAC, Scott AFB, Illinois was designed and adopted. A USAFETAC numbered project was assigned for converting all COLFAC files into the USAFETAC DATSAV format. Selected stations from the TDF files are also to be converted. The airways observations from the DATSAV files were also used to complete the surface working file. Observations in DATSAV surface format begin in 1966 and are maintained in yearly files by World Meteorological Organization (WMO) station-number order. Data received in subsequent years will be added to this file and a continuing data base will be maintained.

b. Upper-Air Data Set. The Upper-Air Data Set contains rawinsonde and pilot balloon observations that are derived from reports received at AFGWC over the AWN. These observations are hydrostatically checked before being sent to USAFETAC. As with surface data, each observation is checked against the AWSMSC. Vertical soundings derived from satellite data are maintained on a separate file, but in the same format as the regular upper-air data.

The USAFETAC Upper-Air Data Set contains upper-air data starting with 1 January 1973. Data for longer periods may be available for those stations for which TDF files are available at OL-A; however, TDF conversions are made on a case-by-case basis. Data for 1 January 1973 through 30 September 1975 have been converted from the 36-bit DATSAV files built on an IBM 7044 computer to the 32-bit DATSAV format presently in use. Data since 1 October 1975 have been processed on an IBM 360/44 computer into the 32-bit DATSAV format.

c. Aircraft Data Set. The Aircraft Data Set contains aircraft reports decoded by AFGWC (RECCO, COMPAR, ICAO, CODAR, MAC Abbreviated, etc.) and transmitted to USAFETAC on the daily upper-air ARFANET tape. The file does not contain plain-language FIREF Data. These data are available only for the period since 1 October 1975.

d. Quality Control. The daily surface and upper-air data are checked by the Problem Identification Program (PIF) that identifies class errors within the data base. These class errors are documented in the Data Base Anomalies File. Analysts should use this file to check for anomalies in the data. No validity checks are made on the DATSAV aircraft data.

## USAFETAC SURFACE DATA BASE (1963-1977)

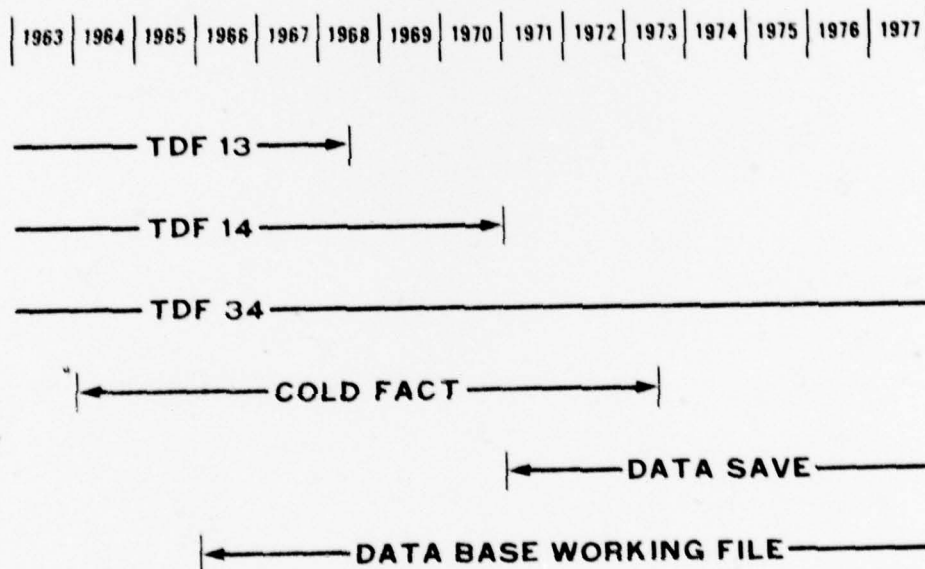


Figure 1. USAFETAC Surface Data Base History

## Appendix A

### DATSAV SURFACE FILE CONSTRUCTION AND FORMAT

#### DATSAV Surface File Construction

DATSAV Surface is the term used at USAFETAC to reference the DATSAV Surface File Data Set in eight-bit byte format. The DATSAV Surface File consists of blocked variable-length records. The maximum length of a data record is 2500 bytes and the maximum length of a block is 9990 bytes.\* There are no header or trailer records. The file is recorded on 9-track tape at 1600 BPI recording density. Each 2400-foot tape contains a maximum of 3800 blocks of data. The remainder of each tape is reserved as an unused buffer area to facilitate reel-to-reel data base compatibility with CL-A. The sequence of the data is ELKSTN-YR-MO-DA-HR-MI-LAT-LON-TYPE RPT-OB TYPE. Following are some general comments about the file construction:

a. The format is designed so that 32-bit binary fields are word aligned and 16-bit binary fields are half-word aligned. This format assumes that Field COL is word aligned in core.

b. Each field is in either 16-bit binary, 32-bit binary, or EECDIC notation. Unless otherwise specified, each field is recorded in binary.

c. Unless otherwise noted, when data are missing from a field, all bits in that field are turned on.

d. Fields designated as "Open" contain all bits on.

e. Words in the Additional Data Section are not necessarily in sequence according to their indicators.

f. CAUTION must be exercised in determining the true value of negative binary fields. If you are using DATSAV on a machine using twos complement arithmetic, you must add one to the value obtained when accessing DATSAV.

g. Analysts must avoid trying to obtain more accuracy from meteorological data than was originally observed. For example, Fahrenheit temperature is reported in whole degrees. When converting temperatures from Kelvin (°K) to Fahrenheit (°F), a tenths value is generated due to the rounding necessitated in the original conversion from °F to °K. The resultant value of the conversion from °K to °F should be made to the nearest tenth of a degree and ROUNDED to the nearest WHOLE degree. Never try to use more accuracy than was originally reported. Every analyst should know the original reporting units of the elements to be used.

#### DATSAV Surface Format Explanation

The DATSAV Surface format explanation is divided into four sections: Control, Mandatory Data, Additional Data, and Remarks. An area located between the Control Section and the Mandatory Data Section is reserved for future assignment to either of the abutting sections and/or for general use. The Control Section is fixed in format and length whereas the other sections are expandable by the nature of their design. Each section is more fully described in the detailed format description.

All WMO Codes referenced in this Appendix are reproduced in Appendix D to this handbook. The user can also find the explanation of these codes in the WMO Manual on Codes, No. 9,\*\* or AWSM 105-24.\*\*\*

\* Each block of data is preceded by one 32-bit word containing the block length in the leftmost half-word; the rightmost half-word may contain any value.

\*\* World Meteorological Organization, Manual on Codes, Vol I, WMO No. 9, Geneva, Switzerland, 1972.

\*\*\* U.S. Air Force, Air Weather Service, Meteorological Codes, AWSM 105-24, Vol III, 16 Jan 75.





## ADDITIONAL DATA SECTION, CON'T

[illegible]

ADDITIONAL DATA SECTION, CON'T

[illegible]

## ADDITIONAL DATA SECTION, CON'T

[illegible]

## REMARKS SECTION

[illegible]

Figure A-1. DATSAV Surface Format for IBM 360/44. (Continued)

### CONTROL SECTION

This section contains fields that are pertinent to the time and type of the observation and the identification and location of the station. See CAUTION, Item 5, Page 5. Refer to Figure A-1, Pages 6 and 7.

<u>FIELD</u>	<u>Description of the Element and Comments</u>
C01	<u>REC LNG BYTES</u> (Record-Length Bytes): The two leftmost bytes constitute a binary field containing a count of the total bytes in the record; the count must be evenly divisible by four. The two rightmost bytes contain EBCDIC blanks. This length is separate and distinct from <u>block length</u> .
C02	<u>ADD DATA BYTES</u> (Additional-Data Bytes): A count of the total number of bytes in the Additional Data Section; the count must be evenly divisible by 12.
C03	<u>RMKS BYTES</u> (Remarks Bytes): A count of the total number of bytes in the Remarks Section; the count must be evenly divisible by four.
C04	<u>BLOCK STATION</u> : A six-digit number according to the AWS Master Station Catalog. Non-permanent ships are entered as six 9's.
C05	<u>YR</u> (Year): The last two digits of the year.
C06	<u>MO</u> (Month): 1-12
C07	<u>DA</u> (Day): 1-31
C08	<u>HR</u> (Hour): 0-23
C09	<u>MIN</u> (Minutes): 0-59
C10	<u>TYPE RPT</u> (Type Report): 0 = Reserved 1 = Reserved 2 = Surface hourly (includes record specials) 3 = Surface special (excludes record specials) 4 = I. D. Report
C11	<u>OB TYPE</u> (Observation Type): 0 = Synoptic 1 = Airways 2 = METAR 3 = Synoptic-Airways merged 4 = Synoptic-METAR merged 5 = Reserved 6 = Aero 7 = SMARS 8 = Synoptic-Aero merged
C12	<u>LAT</u> (Latitude): In degrees and minutes (e.g., 25°16'W is stored as 2516); south latitudes are negative.
C13	<u>LCN</u> (Longitude): In degrees and minutes (e.g., 105°59'W is stored as 10559); east longitudes are negative.
C14	<u>STN ELEV</u> (Station Elevation): In meters; elevations below MSL are negative.

NOTE: A zero entry in the LAT, LCN, and STN ELEV fields indicates that the station name and location were unknown.

Field	Description of the Elements and Comments (continued)
C15	<u>GWC REG</u> (AFGWC Region): A number (0-81) giving the geographical location of the station according to a fixed grid maintained at AFGWC (Figure D-1, Page 53 and Figure D-2, Page 54).
C16	<u>W2</u> : In ship observations only, represents the element forming the principal object of a report of deterioration or improvement of the weather, or for the taking of a special observation, and is a number (0-9) according to WMO Code 4663 (Page 68).
C17	<u>QUAD</u> (Quadrant): In ship observations only, represents the quadrant of the globe for ship reports and is a number (1,3,5,7) according to WMO Code 3333 (Page 66).
C18	<u>WIND IND</u> (Wind Indicator): In ship observations only, a number (0,1,3,4) according to WMO Code 1855 (Page 63).
C19	<u>CALL LETTERS</u> : The station's assigned call letters in EBCDIC form; up to four letters, left justified. Unused positions are EBCDIC blanks. An all-blank field indicates the station does not have assigned call letters.
C20	<u>FMT</u> (Format): A constant value of 20 until such time as the AFGWC format is changed.
C21	<u>STN CTRL</u> (Station Control): Indicates what organization controls the station as follows: <ul style="list-style-type: none"> <li>0 = Info not available (= blank on AWSMSC)</li> <li>1 = Air Force or Army</li> <li>2 = Navy, Marine, or Coast Guard</li> <li>3 = NOAA</li> <li>4 = FAA</li> <li>5 = Other</li> </ul>

#### RESERVED FIELDS

The six reserved fields located between the Control Section and the Mandatory Data Section are for future expansion. As long as a reserved field remains unassigned, it may be used for temporary storage of any parameter such as intermediate calculations, indicators, etc.

R01	Unassigned.
R02	Unassigned.
R03	Unassigned.
R04	Unassigned.
R05	Assigned to the Mandatory Data Section in lieu of Field M31.  <u>IND GEO HT</u> (Indicator for Geopotential Height): Specifies reporting level of the Geopotential Height (Field R06) as follows: <ul style="list-style-type: none"> <li>3 = 850-millibar geopotential height</li> <li>4 = 700-millibar geopotential height</li> <li>5 = 500-millibar geopotential height</li> <li>6 = Not available</li> </ul>
R06	Assigned to the Mandatory Data Section in lieu of Field M32.  <u>GEO HT</u> (Geopotential Height): In geopotential meters.



# MANDATORY DATA SECTION

The mandatory data fields are always included in the format in their fixed locations although their data are sometimes missing from the observations. See CAUTION, Item 5, Page 5. Refer to Figure A-1, Pages 6 and 7.

<u>FIELD</u>	<u>Description of the Elements and Comments</u>
M01	<u>WIND DIR</u> (Wind Direction): In whole degrees (0-360). Variable wind direction entered as 990; calm = 0.
M02	<u>WIND SPD</u> (Wind Speed): In tenths of meters per second (e.g., 12.2 is 122); calm = 0.
M03	<u>WIND GUST</u> : In tenths of meters per second (e.g., 40.4 is 404). All bits on when the element is not reported. Exception: 1 Oct 75 - 31 Jul 76, zero was stored if no gusts were reported.
M04	<u>SL PRES</u> (Sea Level Pressure): In tenths of millibars (e.g., 1013.2 is 10132).
M05	<u>APF</u> (Barometric Tendency): A four-digit number where the leftmost digit represents the characteristic of the tendency according to WMO Code 0200 (Page 55). The remaining three digits are the amount of change in tenths of millibars (e.g., 12.2 is 122).
M06	<u>DRY BULB TEMP</u> (Dry-Bulb Temperature): In tenths of degrees Kelvin (e.g., 273.5 is 2735). On 5 Apr 77, 1200Z, conversion to Kelvin from Celsius changed from 273.0 to 273.2.
M07	<u>DEW PT DEP</u> (Dew-Point Depression): In tenths of Kelvin degrees (e.g., 10.2 is 102).
M08	<u>ALT SET</u> (Altimeter Setting): In hundredths of inches (e.g., 29.92 is 2992).
M09	<u>6 HOUR PRCP</u> (6-Hour Precipitation Amount): In millimeters; values 0.1 to 0.6 millimeters and trace are recorded as 91-97, signed negative (negative values are computed by USAFETAC).

NOTE: The following exceptions apply:

Missing = 0 during the period 1 Jan 66 to 1 Jun 73  
Trace = 0 during the period 1 Oct 75 to 1 Aug 76

M10 SKY CCV (Total Sky Cover): The total fraction of the celestial dome covered by clouds regardless of their type, reported as follows:

Synoptic Reports	0-8 = 0-8 eighths 9 = obscured
Airways Reports	-2 = Scattered -7 = Broken -8 = Overcast -9 = Obscured -10 = Partially obscured
METAR Reports	Data not available

NOTE: In airways reports, negative values are used to denote a sky condition with an implicit rather than an explicit amount. In merged synoptic/airways reports the synoptic value is given, if available, in preference to the estimated airways value.

M11	<u>FAST WX</u> (Past Weather): Zero to nine according to WMO Code 4500 (Page 68).
M12	<u>VSEY</u> (Visibility): In whole meters; values greater than 160,000 are entered as 160,000. Visibilities derived from TDF and CCLD FACT used 1609.344 meters per mile if a conversion was needed. Visibilities derived from DATSAV used 1600 meters per mile if a conversion was needed.

Field

Description of the Elements and Comments (continued)

M13

C: An indicator (0-1) to denote the characteristic of the visibility report in airways observations:  
  
0 = Non-variable report  
1 = Variable report with the variation reported in the REMARKS Section

M14

WW1 (Present Weather): Reserved for synoptic and aero reports. Given as a distinct number (00-99) according to WMO Code 4677 (Pages 69-72). Entered as all bits on for other than synoptic and aero reports.

M15,M16,M17

WW2, WW3, WW4 (Present Weather): Reserved for AIRWAYS and METAR reports; for METAR reports, only WW2 is used. In airways reports when multiple weather elements are reported, WW2 is used first, then WW3, WW4, etc., as needed. For information on WW5, WW6, and WW7, see also Additional Data Word Type 1. Unused elements and illegal codes are entered as all bits on. For METAR reports WW is given according to WMO Code 4677 (Pages 69-72). For airways reports WW is given as follows:  
  

00 = None	51 = L-	67 = ZR	85 = SW--,SW-
04 = K	53 = L	70 = S--	86 = SW,SW+
05 = H	55 = L+	71 = S-	87 = AP-,SP-,1FW
06 = D	56 = ZL-	73 = S	88 = AP,SP
07 = BD,BN,BY	57 = ZL	75 = S+	89 = A
11 = CF	60 = R--	76 = IC	95 = TRW,TSW
17 = T	61 = R-	77 = SG	99 = TA,TAP
36 = BS	63 = K	79 = E,EW,IF	
45 = F,IF	65 = R+	80 = RW--,RW-	
50 = L--	66 = ZR-	81 = RW,RW+	

M18

STN PRES (Station Pressure): In tenths of millibars (e.g., 1013.2 is 10132).

M19

NR: The fraction of the celestial dome covered by all the CL-clouds present or, if no CL-clouds are present, the fraction covered by all the CM-clouds present. Given in eighths (0-9), where 9 = obscured. Not reported for airways.

M20

CL: The type of low cloud (0-9) according to WMO Code 0513 (Page 57). For airways, on 3- and 6-hourly reports only.

M21

H: The height above ground of the base of the lowest cloud seen (0-9) according to WMO Code 1600 (Page 62). Not reported for airways.

M22

CM: The type of middle cloud (0-9) according to WMO Code 0515 (Page 58). For airways, on 3- and 6-hourly reports only.

M23

CH: The type of high cloud (0-9) according to WMO Code 0509 (Page 56). For airways, on 3- and 6-hourly reports only.

NOTE: M24-M27 are for the first reported cloud layer in METAR, synoptic, and airways reports. Succeeding layers are stored in Additional Data Word Type 08.

M24

NS: The amount of clouds in the layer, reported as specified in word M10. Exception: If a partial obscuration is reported, NS = 10 and K = CT = ESHS = 0.

M25

K: The classification of clouds according to height above ground as follows:  
  
0 = No clouds (NS = 0)  
1 = Low clouds (SC,ST,CU,CB,FS,FC)  
2 = Middle clouds (AC,AS,NS)  
3 = High clouds (CI,CC,CS)  
4 = Obscured sky  
>4 = Not used



MANDATORY DATA SECTION (continued)

Field

Description of the Elements and Comments (continued)

M26

CT: The type of cloud (0-9) within each height classification:  
  
If low clouds (K=1) see WMO Code 0513 (Page 57)  
If middle clouds (K=2) see WMO Code 0515 (Page 58)  
If high clouds (K=3) see WMO Code 0509 (Page 56)  
  
Cloud types reported in alphabetical characters (METAR) or by WMO Code 0500 (Page 55). Synoptic and airways are converted to one of the codes above and the inter-relationships are given below. This field is missing on airways whenever lxxx cloud group is not reported.  
  
Correspondence between WMO Code 0500 and Codes 0513, 0515, and 0509 (Pages 55-58)  

CODE	CLOUD	CORRESPONDENCE
0	CI	CH = 1
1	CC	CH = 9
2	CS	CH = 8
3	AC	CM = 7
4	AS	CM = 1
5	NS	CM = 2
6	SC	CL = 5
7	ST	CL = 6
8	CU	CL = 2
9	CB	CL = 9
-	FS	CL = 7
-	FC	CL = 7

M27

HS: The height above ground of the base of the cloud layer (00-99) according to WMO Code 1677 (Page 63); heights reported as "H1" (airways) are coded as 88.

M28

T: Type of device used to measure ceilings in airways reports (A = aircraft, E = estimated, M = measured, etc.); given as an EBCDIC character in the leftmost position with all bits on in the rightmost position. Exception: Data prior to 1 Jan 75 may contain a hexadecimal '6A' in leftmost position to indicate missing.

M29

CC: The cloud-layer characteristic is given as an EBCDIC character in the leftmost position as follows: the rightmost position is all bits on except 1 Oct 75 - 31 Mar 76, during which period a hexadecimal '40' entry is contained in the rightmost byte when a valid entry is contained in the leftmost byte. This element is missing except in airways reports. Exception: Data other than missing stored in leftmost position as binary prior to 1 Jan 75.  
  
0 = Typical conditions with no remarks  
1 = Variable height with variability information in REMARKS Section  
2 = Variable amount with variability information in REMARKS Section  
3 = Thin clouds

M30

CIG (Ceiling): The height above ground of the base of the lowest cloud layer whose amount is 5/8 (airways = broken) or greater; given as a distinct number according to WMO Code 1677 (Page 63).  
  
If 8-groups are reported in synoptic reports, the coded height of the base of the lowest cloud layer having 5/8 or more cloud coverage is stored in ceiling. If coverage is less than 5/8, a value of 89 is stored in ceiling. If no 8-groups are reported, ceiling is coded as missing.

Field                      Description of the Elements and Comments    (continued)

In airways reports, ceiling is the base of the lowest cloud layer reporting broken or overcast conditions. In the case of a full obscuration, ceiling is the vertical visibility. If neither of the above conditions is reported, ceiling is coded as 89. Prior to Jul 72, the ceiling is coded as a -1, or possibly a 4095, instead of 89.

In METAR reports, ceiling is obtained from the METAR Remarks in the Remarks Section. If ceiling is not found in the Remarks Section, it is coded as missing. If "CIGNO" is found, ceiling is coded as 89. If "CAVOK" is reported, the ceiling is coded as 51.

M31 (R05)    IND GEO HT (Indicator For Geopotential Height): Specifies reporting level of the Geopotential Height (Field M32) as follows:

- 3 = 850-millibar geopotential height
- 4 = 700-millibar geopotential height
- 5 = 500-millibar geopotential height
- 6 = Not available

M32 (R06)    GEO HT (Geopotential Height): In geopotential meters.

#### ADDITIONAL DATA SECTION

This section is composed of a variable number of subgroups or words. Each word is 12 bytes long and is identified, as to type, by an indicator field. There may be multiple words of the same type (same indicator) in a single observation. Additional Data Words are included only as data are available. Formats of the various word types are given below. Unless noted otherwise, each field is in binary notation. See CAUTION, Item 5, Page 5. Refer to Figure A-1, Pages 6 and 7.

Field	Description of the Elements and Comments
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WORD TYPE 01, Additional Present-Weather Data.

IND: Value is 1.

WW5, WW6, WW7 (Present Weather): An extension of the present-weather fields in the Mandatory Data Section (Fields M15-M17) for additional airways data that could not be contained in that section. Unused elements are entered as all bits on.

WORD TYPE 02, State-of-the-Ground Data.

IND: Value is 2.

N: The 6-hourly accumulation of newly fallen snow (in centimeters).

E: Total snow depth (in centimeters). Codes originally reported by WMO Code 3800 (Page 67) are given a centimeter equivalent of the approximate midpoint between WMO codes and are signed negative.

E: State-of-the-Ground (0-9) according to WMO Code 0900 (Page 60).

WORD TYPE 03, Ship-Temperature Data.

IND: Value is 3.

AIR SEA TEMP (Air-Sea Temperature Difference): In tenths of Kelvin degrees (e.g., 10.2 is 102). Minus values indicate air temperature less than sea temperature.

SEA SFC TEMP (Sea-Surface Temperature): In tenths of degrees Kelvin (e.g., 275.2 is 2752). On 5 Apr 77, 1200Z, conversion to Kelvin from Celsius changed from 273.0 to 273.2.

WORD TYPE 04, Ship-Movement Data.

IND: Value is 4.

CS: Ship's Course (0-9) according to WMO Code 0700 (Page 59).

VS: Ship's Average Speed (0-9) according to WMO Code 4451 (Page 68).

WORD TYPE 05, Wind-Wave Data.

IND: Value is 5.

FLR WIND WAVE (Period of Wind Waves): In seconds.

HGT WIND WAVE (Height of Wind Waves): In tenths of meters (e.g., 10.2 is 102).

Field            Description of the Elements and Comments    (continued)

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WORD TYPE 06, Swell-Wave Data.

IND: Value is 6.

DWDW: The direction from which the waves are coming, in tens of degrees.

PLR SWLS (Period of Swell Waves): In seconds.

HGT SWLS (Height of Swell Waves): In tenths of meters (e.g. 12.2 is 122).

---

WORD TYPE 07, Maximum/Minimum Temperature Data.

IND: Value is 7.

MAX TEMP (Maximum Temperature): In tenths of degrees Kelvin (e.g., 275.2 is 2752).

MIN TEMP (Minimum Temperature): In tenths of degrees Kelvin (e.g., 275.2 is 2752).  
On 5 Apr 77, 1200Z, conversion to Kelvin from Celsius changed from 273.0 to 273.2.

---

WORD TYPE 08, Cloud Data.\*

IND: Value is 8.

NS:

K:

CT:

BSHS:

\* Definitions are identical to those in the Mandatory-Data Section, Fields M24-M27.

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WORD TYPE 09, Supplemental Cloud Data.\*

IND: Value is 9.

T:

CC:

CLC (Ceiling):

\* Definitions are identical to those in the Mandatory-Data Section, Fields M28-M30; exceptions also apply.

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WORD TYPE 10, Runway Visual-Range Data.

IND: Value is 10.

RNW NUM (Runway Number): In tens of degrees.

RVK (Runway Visual Range): In meters.

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ADDITIONAL DATA SECTION (continued)

Field Description of the Elements and Comments (continued)

WORD TYPE 11, Ice Accretion Data.

IND: Value is 11.

IS: Ice accretion on ships (1-5) according to WMO Code 1751 (Page 63).

RS: Rate of ice accretion on ships (0-6) according to WMO Code 3551 (Page 66).

LSLS: Thickness of ice accretion on ships (in centimeters).

WORD TYPE 12, Ice Data.

IND: Value is 12.

C2: Description of kind of ice (0-9) according to WMO Code 0663 (Page 59).

K: Effect of ice on navigation (0-9) according to WMO Code 2100 (Page 63).

D1: Bearing of ice edge (0-9) according to WMO Code 0739 (Page 59).

R: Distance to ice edge from reporting ship (0-9) according to WMO Code 3600, (Page 66).

L: Orientation of ice edge (0-9) according to WMO Code 1000 (Page 60).

WORD TYPE 13, Additional Precipitation Data.

IND: Value is 13.

RPTD PRCP (Reported Precipitation): In millimeters; the values 0.1 to 0.6 millimeters and trace are recorded as 91-97, signed negative.

24-HOUR PRECIP (24-Hour Precipitation): Recorded same as reported precipitation, above.

NOTE: A "trace" from airways observations in reported precipitation is stored as zero until 1 Apr 77.

WORD TYPE 14, 24-Hour Pressure-Change Data.

IND: Value is 14.

24-HOUR PRESS CHANGE (24-Hour Pressure Change): In tenths of millibars (e.g., 1013.2 is 10132); pressure falls are negative.

SYNOPTIC WIND GUST: Maximum wind gust since last observation, in tenths of meters per second (e.g., 12.2 is 122); may be up to a 6-hour time span.



Field            Description of the Elements and Comments (continued)

WORD TYPE 15, Ground Data.

IND: Value is 15.

GRND TEMP (Ground Temperature): The minimum grass temperature for the preceding night, in tenths of degrees Kelvin (e.g., 275.2 is 2752). On 5 Apr 77, 1200Z, conversion to Kelvin from Celsius changed from 273.0 to 273.2.

WAT EQUIV (Water Equivalent): In millimeters; water equivalent of the snow or ice on the ground.

HAIL FLAG: All bits on = not reported; value of 1 = hail reported.

HAIL SIZE: All bits on = not reported; value of 0-14 = hail size in centimeters.

---

WORD TYPE 16, Bogus Precip Data.

IND: Value is 16.

PRECIP FLAG (Precipitation Flag):

- 0 = Reported amount of precipitation and reported weather agree
- 1 = Precipitation missing or not reported and none inferred by weather
- 2 = Precipitation missing, but precipitation inferred by weather
- 3 = Precipitation reported, but none inferred by weather
- 4 = Zero precipitation reported, but precipitation inferred by weather
- 5 = Zero precipitation reported, no precipitation inferred, and precipitation not occurring at the reporting station.

B'GUS PRECIP AMT (Bogus Precipitation Amount): In whole millimeters for a 3-hour synoptic period.

NOTE: These data are not calculated for all WMO Blocks.

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### REMARKS SECTION

This section contains all remarks from airways and METAR observations. It also includes all synoptic groups after the five mandatory groups, whether decoded or not. The format is:

<u>Field</u>	<u>Description of the Elements and Comments</u>
--------------	-------------------------------------------------

IND: Value is:

61 for synoptic remarks

62 for airways remarks

63 for METAR remarks

REMARKS: A variable number of EBCDIC characters.

RMKS FILL (Remarks Fill): EBCDIC blanks to cause the total length of the section to be a multiple of four bytes.

NOTE: In the case of merged reports (e.g., synoptic/airways), the remarks from both reports may be present.

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## Appendix E

### DATSAV UPPER-AIR FILE CONSTRUCTION AND FORMAT

#### DATSAV Upper-Air File Construction

DATSAV Upper-Air is the term used at USAFETAC to reference the DATA SAVE Upper-Air Data Set in eight-bit byte format. The DATSAV Upper-Air File consists of blocked variable-length records. The maximum length of a data record is 2500 bytes and the maximum length of a block is 9990 bytes.\* There are no header or trailer records. The file is recorded on 9-track tape at 1600 BPI recording density. Each 2400-foot tape contains a maximum of 3800 blocks of data. The remainder of each tape is reserved as an unused buffer area to facilitate reel-to-reel data base compatibility with OL-A. The sequence of the file is BLKSTN-YR-MO-DA-HR-MI-LAT-LON-TYPE REPORT-CB TYPE. Following are some general comments about the file construction:

a. The format is designed so that 32-bit binary fields are word aligned and 16-bit binary fields are half-word aligned. This format assumes that Field C01 is word aligned in core.

b. Each field is in either 16-bit binary, 32-bit binary, or EECBIC notation. Unless otherwise specified, each field is recorded in binary.

c. Unless otherwise noted, when data are missing from a field, all bits in that field are turned on.

d. Fields designated as "Open" contain all bits on.

e. CAUTION must be exercised in determining the true value of negative binary fields. If you are using DATSAV on a machine using twos complement arithmetic, you must add one to the value obtained when accessing DATSAV.

f. CAUTION: It should be noted that no corrections have been applied to the stratospheric temperatures to account for solar radiation. Each analyst must apply his own corrections for solar radiation.

#### DATSAV Upper-Air Format Explanation

The DATSAV Upper-Air format explanation is divided into three sections: Control, Data, and Remarks. The Control Section is fixed in format and length whereas the other sections are expandable by the nature of their design. Each section is more fully described in the detailed format description.

All WMO Codes referenced in this Appendix are reproduced in Appendix D to this handbook. The user can also find the explanation of these codes in the WMO Manual on Codes, No. 9\*\*, or AWSM 105-24\*\*\*.

\* Each block of data is preceded by one 32-bit word containing the block length in the leftmost half-word; the rightmost half-word may contain any value.

\*\* World Meteorological Organization, Manual on Codes, Vol I, WMO No. 9, Geneva, Switzerland, 1972.

\*\*\* U.S. Air Force, Air Weather Service, Meteorological Codes, AWSM 105-24, Vol III, 16 Jan 75.

# CONTROL SECTION, ALL OB TYPES

FIELD NO	C01	C02	C03	C04	C05	C06	C07	C08	C09	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20	C21
REC																					
NAME	NOT	DATA	BYTES	BLOCK	STATION	YR	MO	DA	HR	MIN	TYPE	OB	RPT	LAT	+	+	+	+	+	+	+
VALUE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
LOCATION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21

FIELD NO	C22	C23	C24	C25	C26	ROI	KIND OF REPORT
NAME	INDIVIDUALLY DESCRIBED FOR EACH OB TYPE (SEE BELOW)						
VALUE							
LOCATION	1	2	3	4	5	6	7

FIELD NO	KIND OF REPORT (RAB)										KIND OF REPORT (WINDS)										KIND OF REPORT (POCOB)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
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	VT	OPEN	PR	S	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ	BA	BB	BC	BD	BE	BF	BG	BH	BI	BJ	BK	BL	BM	BN	BO	BP	BQ	BR	BS	BT	BU	BV	BW	BX	BY	BZ	CA	CB	CC	CD	CE	CF	CG	CH	CI	CJ	CK	CL	CM	CN	CO	CP	CQ	CR	CS	CT	CU	CV	CW	CX	CY	CZ	DA	DB	DC	DD	DE	DF	DG	DH	DI	DJ	DK	DL	DM	DN	DO	DP	DQ	DR	DS	DT	DU	DV	DW	DX	DY	DZ	EA	EB	EC	ED	EE	EF	EG	EH	EI	EJ	EK	EL	EM	EN	EO	EP	EQ	ER	ES	ET	EU	EV	EW	EX	EY	EZ	FA	FB	FC	FD	FE	FF	FG	FH	FI	FJ	FK	FL	FM	FN	FO	FP	FQ	FR	FS	FT	FU	FV	FW	FX	FY	FZ	GA	GB	GC	GD	GE	GF	GG	GH	GI	GJ	GK	GL	GM	GN	GO	GP	GQ	GR	GS	GT	GU	GV	GW	GX	GY	GZ	HA	HB	HC	HD	HE	HF	HG	HH	HI	HJ	HK	HL	HM	HN	HO	HP	HQ	HR	HS	HT	HU	HV	HW	HX	HY	HZ	IA	IB	IC	ID	IE	IF	IG	IH	II	IJ	IK	IL	IM	IN	IO	IP	IQ	IR	IS	IT	IU	IV	IW	IX	IY	IZ	JA	JB	JC	JD	JE	JF	JG	JH	JI	IJ	JK	KL	KM	KN	KO	KP	KQ	KR	KS	KT	KU	KV	KW	KX	KY	KZ	LA	LB	LC	LD	LE	LF	LG	LH	LI	LJ	LK	LL	LM	LN	LO	LP	LQ	LR	LS	LT	LU	LV	LW	LX	LY	LZ	MA	MB	MC	MD	ME	MF	MG	MH	MI	MJ	MK	ML	MM	MN	MO	MP	MQ	MR	MS	MT	MU	MV	MW	MX	MY	MZ	NA	NB	NC	ND	NE	NF	NG	NH	NI	NJ	NK	NL	NM	NN	NO	NP	NQ	NR	NS	NT	NU	NV	NW	NX	NY	NZ	OA	OB	OC	OD	OE	OF	OG	OH	OI	OJ	OK	OL	OM	ON	OO	OP	OQ	OR	OS	OT	OU	OV	OW	OX	OY	OZ	PA	PB	PC	PD	PE	PF	PG	PH	PI	PJ	PK	PL	PM	PN	PO	PP	PQ	PR	PS	PT	PU	PV	PW	PX	PY	PZ	QA	QB	QC	QD	QE	QF	QG	QH	QI	QJ	QK	QL	QM	QN	QO	QP	QQ	QR	QS	QT	QU	QV	QW	QX	QY	QZ	RA	RB	RC	RD	RE	RF	RG	RH	RI	RJ	RK	RL	RM	RN	RO	RP	RQ	RR	RS	RT	RU	RV	RW	RX	RY	RZ	SA	SB	SC	SD	SE	SF	SG	SH	SI	SJ	SK	SL	SM	SN	SO	SP	SQ	SR	SS	ST	SU	SV	SW	SX	SY	SZ	TA	TB	TC	TD	TE	TF	TG	TH	TI	TJ	TK	TL	TM	TN	TO	TP	TQ	TR	TS	TT	TU	TV	TW	TX	TY	TZ	UA	UB	UC	UD	UE	UF	UG	UH	UI	UJ	UK	UL	UM	UN	UO	UP	UQ	UR	US	UT	UU	UV	UW	UX	UY	UZ	VA	VB	VC	VD	VE	VF	VG	VH	VI	VJ	VK	VL	VM	VN	VO	VP	VQ	VR	VS	VT	VU	VV	VW	VX	VY	VZ	WA	WB	WC	WD	WE	WF	WG	WH	WI	WJ	WK	WL	WM	WN	WO	WP	WQ	WR	WS	WT	WU	WV	WW	WX	WY	WZ	XA	XB	XC	XD	XE	XF	XG	XH	XI	XJ	XK	XL	XM	XN	XO	XP	XQ	XR	XS	XT	XU	XV	XW	XX	XY	XZ	YA	YB	YC	YD	YE	YF	YG	YH	YI	YJ	YK	YL	YM	YN	YO	YP	YQ	YR	YS	YT	YU	YV	YW	YX	YZ	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZZ	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ	BA	BB	BC	BD	BE	BF	BG	BH	BI	BJ	BK	BL	BM	BN	BO	BP	BQ	BR	BS	BT	BU	BV	BW	BX	BY	BZ	CA	CB	CC	CD	CE	CF	CG	CH	CI	CJ	CK	CL	CM	CN	CO	CP	CQ	CR	CS	CT	CU	CV	CW	CX	CY	CZ	DA	DB	DC	DD	DE	DF	DG	DH	DI	DJ	DK	DL	DM	DN	DO	DP	DQ	DR	DS	DT	DU	DV	DW	DX	DY	DZ	EA	EB	EC	ED	EE	EF	EG	EH	EI	EJ	EK	EL	EM	EN	EO	EP	EQ	ER	ES	ET	EU	EV	EW	EX	EY	EZ	FA	FB	FC	FD	FE	FF	FG	FH	FI	FJ	FK	FL	FM	FN	FO	FP	FQ	FR	FS	FT	FU	FV	FW	FX	FY	FZ	GA	GB	GC	GD	GE	GF	GG	GH	GI	GJ	GK	GL	GM	GN	GO	GP	GQ	GR	GS	GT	GU	GV	GW	GX	GY	GZ	HA	HB	HC	HD	HE	HF	HG	HH	HI	HJ	HK	HL	HM	HN	HO	HP	HQ	HR	HS	HT	HU	HV	HW	HX	HY	HZ	IA	IB	IC	ID	IE	IF	IG	IH	II	IJ	IK	IL	IM	IN	IO	IP	IQ	IR	IS	IT	IU	IV	IW	IX	IY	IZ	JA	JB	JC	JD	JE	JF	JG	JH	JI	IJ	JK	KL	KM	KN	KO	KP	KQ	KR	KS	KT	KU	KV	KW	KX	KY	KZ	LA	LB	LC	LD	LE	LF	LG	LH	LI	LJ	LK	LM	LN	LO	LP	LQ	LR	LS	LT	LU	LV	LW	LX	LY	LZ	MA	MB	MC	MD	ME	MF	MG	MH	MI	MJ	MK	ML	MM	MN	MO	MP	MQ	MR	MS	MT	MU	MV	MW	MX	MY	MZ	NA	NB	NC	ND	NE	NF	NG	NH	NI	NJ	NK	NL	NM	NN	NO	NP	NQ	NR	NS	NT	NU	NV	NW	NX	NY	NZ	OA	OB	OC	OD	OE	OF	OG	OH	OI	OJ	OK	OL	OM	ON	OO	OP	OQ	OR	OS	OT	OU	OV	OW	OX	OY	OZ	PA	PB	PC	PD	PE	PF	PG	PH	PI	PJ	PK	PL	PM	PN	PO	PP	PQ	PR	PS	PT	PU	PV	PW	PX	PY	PZ	QA	QB	QC	QD	QE	QF	QG	QH	QI	QJ	QK	QL	QM	QN	QO	QP	QQ	QR	QS	QT	QU	QV	QW	QX	QY	QZ	RA	RB	RC	RD	RE	RF	RG	RH	RI	RJ	RK	RL	RM	RN	RO	RP	RQ	RR	RS	RT	RU	RV	RW	RX	RY	RZ	SA	SB	SC	SD	SE	SF	SG	SH	SI	SJ	SK	SL	SM	SN	SO	SP	SQ	SR	SS	ST	SU	SV	SW	SX	SY	SZ	TA	TB	TC	TD	TE	TF	TG	TH	TI	TJ	TK	TL	TM	TN	TO	TP	TQ	TR	TS	TT	TU	TV	TW	TX	TY	TZ	UA	UB	UC	UD	UE	UF	UG	UH	UI	UJ	UK	UL	UM	UN	UO	UP	UQ	UR	US	UT	UU	UV	UW	UX	UY	UZ	VA	VB	VC	VD	VE	VF	VG	VH	VI	VJ	VK	VL	VM	VN	VO	VP	VQ	VR	VS	VT	VU	VV	VW	VX	VY	VZ	WA	WB	WC	WD	WE	WF	WG	WH	WI	WJ	WK	WL	WM	WN	WO	WP	WQ	WR	WS	WT	WU	WV	WW	WX	WY	WZ	XA	XB	XC	XD	XE	XF	XG	XH	XI	XJ	XK	XL	XM	XN	XO	XP	XQ	XR	XS	XT	XU	XV	XW	XX	XY	XZ	YA	YB	YC	YD	YE	YF	YG	YH	YI	YJ	YK	YL	YM	YN	YO	YP	YQ	YR	YS	YT	YU	YV	YW	YX	YZ	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZZ	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ	BA	BB	BC	BD	BE	BF	BG	BH	BI	BJ	BK	BL	BM	BN	BO	BP	BQ	BR	BS	BT	BU	BV	BW	BX	BY	BZ	CA	CB	CC	CD	CE	CF	CG	CH	CI	CJ	CK	CL	CM	CN	CO	CP	CQ	CR	CS	CT	CU	CV	CW	CX	CY	CZ	DA	DB	DC	DD	DE	DF	DG	DH	DI	DJ	DK	DL	DM	DN	DO	DP	DQ	DR	DS	DT	DU	DV	DW	DX	DY	DZ	EA	EB	EC	ED	EE	EF	EG	EH	EI	EJ	EK	EL	EM	EN	EO	EP	EQ	ER	ES	ET	EU	EV	EW	EX	EY	EZ	FA	FB	FC	FD	FE	FF	FG	FH	FI	FJ	FK	FL	FM	FN	FO	FP	FQ	FR	FS	FT	FU	FV	FW	FX	FY	FZ	GA	GB	GC	GD	GE	GF	GG	GH	GI	GJ	GK	GL	GM	GN	GO	GP	GQ	GR	GS	GT	GU	GV	GW	GX	GY	GZ	HA	HB	HC	HD	HE	HF	HG	HH	HI	HJ	HK	HL	HM	HN	HO	HP	HQ	HR	HS	HT	HU	HV	HW	HX	HY	HZ	IA	IB	IC	ID	IE	IF	IG	IH	II	IJ	IK	IL	IM	IN	IO	IP	IQ	IR	IS	IT	IU	IV	IW	IX	IY	IZ	JA	JB	JC	JD	JE	JF	JG	JH	JI	IJ	JK	KL	KM	KN	KO	KP	KQ	KR	KS	KT	KU	KV	KW	KX	KY	KZ	LA	LB	LC	LD	LE	LF	LG	LH	LI	LJ	LK	LM	LN	LO	LP	LQ	LR	LS	LT	LU	LV	LW	LX	LY	LZ	MA	MB	MC	MD	ME	MF	MG	MH	MI	MJ	MK	ML	MM	MN	MO	MP	MQ	MR	MS	MT	MU	MV	MW	MX	MY	MZ	NA	NB	NC	ND	NE	NF	NG	NH	NI	NJ	NK	NL	NM	NN	NO	NP	NQ	NR	NS	NT	NU	NV	NW	NX	NY	NZ	OA	OB	OC	OD	OE	OF	OG	OH	OI	OJ	OK	OL	OM	ON	OO	OP	OQ	OR	OS	OT	OU	OV	OW	OX	OY	OZ	PA	PB	PC	PD	PE	PF	PG	PH	PI	PJ	PK	PL	PM	PN	PO	PP	PQ	PR	PS	PT	PU	PV	PW	PX	PY	PZ	QA	QB	QC	QD	QE	QF	QG	QH	QI	QJ	QK	QL	QM	QN	QO	QP	QQ	QR	QS	QT	QU	QV	QW	QX	QY	QZ	RA	RB	RC	RD	RE	RF	RG	RH	RI	RJ	RK	RL	RM	RN	RO	RP	RQ	RR	RS	RT	RU	RV	RW	RX	RY	RZ	SA	SB	SC	SD	SE	SF	SG	SH	SI	SJ	SK	SL	SM	SN	SO	SP	SQ	SR	SS	ST	SU	SV	SW	SX	SY	SZ	TA	TB	TC	TD	TE	TF	TG	TH	TI	TJ	TK	TL	TM	TN	TO	TP	TQ	TR	TS	TT	TU	TV	TW	TX	TY	TZ	UA	UB	UC	UD	UE	UF	UG	UH	UI	UJ	UK	UL	UM	UN	UO	UP	UQ	UR	US	UT	UU	UV	UW	UX	UY	UZ	VA	VB	VC	VD	VE	VF	VG	VH	VI	VJ	VK	VL	VM	VN	VO	VP	VQ	VR	VS	VT	VU	VV	VW	VX	VY	VZ	WA	WB	WC	WD	WE	WF	WG	WH	WI	WJ	WK	WL	WM	WN	WO	WP	WQ	WR	WS	WT	WU	WV	WW	WX	WY	WZ	XA	XB	XC	XD	XE	XF	XG	XH	XI	XJ	XK	XL	XM	XN	XO	XP	XQ	XR	XS	XT	XU	XV	XW	XX	XY	XZ	YA	YB	YC	YD	YE	YF	YG	YH	YI	YJ	YK	YL	YM	YN	YO	YP	YQ	YR	YS	YT	YU	YV	YW	YX	YZ	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZZ	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ	BA	BB	BC	BD	BE	BF	BG	BH	BI	BJ	BK	BL	BM	BN	BO	BP	BQ	BR	BS	BT

## RA08 PRESSURE LEVEL (IND = 0-4)

FIELD NO	RAOD PRESSURE LEVEL (INCHES)									
	0-4 IND	PRES	HEIGHT	TEMP	DSM PT	OPEN	FLGO	OPEN		
RELATIVE LOCATION	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0
	2	4	0	0	2	0	0	0	0	0

## RAOB TROPOPAUSE LEVEL (IND = 5)

[illegible]

## RAOB CLOUD DATA (IND = 7)

[illegible]

## RAOB STABILITY INDEX (INDEX = 9)

FIELD NO.	SHOW STAG		SWEAT INDEX	OPEN	FLG	OPEN
	9	IND				
NAME						
VALUE						
RELATIVE LOCATION	0001	0002	0004	0008	0016	0032

Figure B-1. DATSAV Upper-Air Format for IBM 360/44 (Continued).



# RA03 THICKNESS/THERMAL WIND (IND = 11-13)

FIELD NO	NAME	VALUE	RELATIVE LOCATION
11-13	IND	THICKNESS	SPD
0 0	0	0	0
0 0	0	0	0
1 2	0	0	0

# RA08 PRECIP WATER/SAT MOISTURE RATIO (IND = 14)

FIELD NO	NAME	VALUE	RELATIVE LOCATION
14	IND	PRECIP WAT	SAT MOIST RAT
0 0	0	0	0
0 0	0	0	0
1 2	0	0	0

# RA08 TURBULENCE DATA (IND = 15)

FIELD NO	NAME	VALUE	RELATIVE LOCATION
15	IND	A	B
0 0	0	0	0
0 0	0	0	0
1 2	0	0	0

# WINDS DATA LEVEL (IND = 0-4)

FIELD NO	NAME	VALUE	RELATIVE LOCATION
0-4	IND	PRES	HEIGHT
0 0	0	0	0
0 0	0	0	0
1 2	0	0	0

Figure B-1. DATSAV Upper-Air Format for IBM 360/44 (Continued).

# WINDS MAX WIND LEVEL (IND = 6)

FIELD NO														
NAME	IND	PRES	HEIGHT	FLG	OPEN	WIND		VAVA	VBVB					
VALUE						DIR	SPD							
RELATIVE LOCATION	1	2												
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1	2	4	8	0	2	6	8	0					

# WINDS MEAN WIND LEVEL (IND = 8)

FIELD NO														
NAME	IND	OPEN				WIND		LVL	OPEN					
VALUE						DIR	SPD							
RELATIVE LOCATION	1	2												
	0	0			0	0	0	0	0					
	0	0			0	0	0	0	0					
	1	2			2	6	8	0	0					

23

# ROCOB DATA LEVEL (IND = 10)

FIELD NO														
NAME	IND	P	HEIGHT	TEMP	PRESS	DIR	SPD	D	DEN					
VALUE														
RELATIVE LOCATION	1	2												
	0	0	0	0	0	0	0	0	0					
	0	0	0	0	0	0	0	0	0					
	1	2	4	8	0	2	6	0	0					

FIELD NO.														
NAME														
VALUE														
LOCATION														

Figure B-1. DATSAV Upper-Air Format for IBM 360/44 (Continued).



# CONTROL SECTION

This section contains fields that are pertinent to the time and type of the observation and the identification and location of the station. See CAUTION, Item 5, Page 19. Refer to Figure E-1, Pages 20-24.

Field	Description of the Elements and Comments
C01	REC LNG BYTES (Record-Length Bytes): The two leftmost bytes constitute a binary field containing a count of the total bytes in the record; the count must be evenly divisible by four. The two rightmost bytes are EBCDIC blanks.
C02	DATA BYTES: A count of the total number of bytes in the Data Section; the count must be evenly divisible by 20.
C03	RMKS BYTES (Remarks Bytes): A count of the total number of bytes in the Remarks Section; the count must be evenly divisible by four.
C04	BLOCK STATION: A six-digit number according to the AWS Master Station Catalog. Non-permanent ships are entered as six 9's.
C05	YR (Year): The last two digits of the year.
C06	MO (Month): 1-12
C07	DA (Day): 1-31
C08	HR (Hour): 0-23
C09	MIN (Minutes): 0-59
C10	TYPE RPT (Type Report): 7
C11	OE TYPE (Observation Type): 0 = Rocketsonde 1 = Winds (merged from all available sources - RACE, PIBAL, etc.) 2 = Radiosonde/Rawinsonde 3 = Dropsonde 4 = VTPR 5 = ATS 6 = ITOS
C12	LAT (Latitude): In degrees and minutes (e.g., 25°16'N is stored as 2516); south latitudes are negative.
C13	LCN (Longitude): In degrees and minutes (e.g., 105°59'W is stored as 10559); east longitudes are negative.
C14	STN ELEV (Station Elevation): In meters; elevations below MSL are negative.
C15	GWC RGN (AFGWC Region): A number (0-81) giving the geographical location of the station according to a fixed grid maintained at AFGWC (Figure D-1, Page 53, and Figure D-2, Page 54).
C16	W2: In ship observations only, represents the element forming the principal object of a report of deterioration or improvement of the weather, or for the taking of a special observation, and is a number (0-9) according to WMO Code 4663 (Page 68).
C17	QUAD (Quadrant): In ship observations only, represents the quadrant of the globe for ship reports and is a number (1,3,5,7) according to WMO Code 3333 (Page 66).



CONTROL SECTION (continued)

Field	Description of the Element and Comments (continued)
C18	WIND IND (Wind Indicator): In ship observations only, a number (0,1,3,4) according to WMO Code 1855 (Page 63).
C19	CALL LETTERS: The station's assigned call letters in EBCDIC form. Up to four letters, left justified. Unused positions are EBCDIC blanks. An all-blank field indicates that the station does not have assigned call letters.
C20	FMT (Format): A constant value of 20 until such time as the AFGWC format is changed.
C21	STN CTRL (Station Control): Indicates what organization controls the station as follows: <ul style="list-style-type: none"> <li>0 = Information not available</li> <li>1 = Air Force or Army</li> <li>2 = Navy, Marine, or Coast Guard</li> <li>3 = NOAA</li> <li>4 = FAA</li> <li>5 = Other</li> </ul>
C22	UA COR BITS (Upper-Air Correction Bits): The 12 low-order bits of the field are indicators which are "on" if the respective report is a corrected report. The bits, left to right, represent the following report types: <ul style="list-style-type: none"> <li>SLAM</li> <li>RAOB (part A)</li> <li>RAOB (part B)</li> <li>RAOB (part C)</li> <li>RAOB (part D)</li> <li>WINDS (part A)</li> <li>WINDS (part B)</li> <li>WINDS (part C)</li> <li>WINDS (part D)</li> <li>Dropsonde (part A)</li> <li>Dropsonde (part B)</li> <li>Rocketsonde</li> </ul>
C23	RAOB INST (RAOB Instrument): The type of radiosonde equipment as specified in the AWS Master Station Catalog.
C24	A4: Type of PIBAL wind-measuring device, according to WMO Code 0265, (Page 55). Exception: If winds came from 21212 Group of RAOB, A4 = 5.
C25	WIND UNITS: Units in which the winds were initially reported: <ul style="list-style-type: none"> <li>1 = Knots</li> <li>2 = Meters per second</li> </ul>
C26	MMM: The number of the MARSDEN square for the ship's position at the time of the observation, according to WMO Code 2590 (Page 64), and WMO Code 2649 (Page 65).

CONTROL SECTION (continued)

Field R01 is reserved for future assignment. The kind-of-report area which immediately follows Field R01 varies in format according to the type of observation (RAOB, WINDS, ROCOB) and always occupies bytes 65-80 for RAOBS and WINDS and bytes 65-100 for ROCOPS. The formats are as follows:

<u>OB BYTES</u>	<u>Description of the Element and Comments</u>
<u>RAOBS</u>	
65-67	<u>OPEN</u> : All bits on.
68-75	<u>KIND INDICATORS</u> : Eight one-byte EBCDIC fields representing the eight possible report types in the observation. EBCDIC "1" indicates the presence of the report and EBCDIC "0" indicates the absence. The report types are:  VTPR = Satellite-derived temperature-height profile S = SLAM RA = RAOB (part A) RE = RAOB (part E) RC = RAOB (part C) RD = RAOB (part D) DA = Dropsonde (part A) DB = Dropsonde (part B)
76	<u>SYN</u> : An indicator denoting whether the observation contains real or synthetic data (EBCDIC):  0 = Real data 1 = Synthetic data
77-78	<u>MAND DATA GRPS</u> (Mandatory Data Groups): A count of the 20-byte data groups in the observation having an indicator value of 0-4.
79-80	<u>ADD DATA GRPS</u> (Additional Data Groups): A count of the 20-byte data groups in the observation having an indicator value greater than 4.
<u>WINDS</u>	
65-70	<u>OPEN</u> : All bits on.
71-75	<u>KIND INDICATORS</u> : Five one-byte EBCDIC fields representing the five possible report types in the observation. EBCDIC "1" indicates the presence of the report type and EBCDIC "0" indicates the absence. The report types are:  SDW = Satellite-derived winds PA = WINDS (part A) PB = WINDS (part B) PC = WINDS (part C) PD = WINDS (part D)
76	<u>SYN</u> : An indicator denoting whether the observation contains real or synthetic data (EBCDIC):  0 = Real data 1 = Synthetic data
77-78	<u>MAND DATA GRPS</u> (Mandatory Data Groups): A count of the 20-byte data groups in the observation having an indicator value of 0-4.
79-80	<u>ADD DATA GRPS</u> (Additional Data Groups): A count of the 20-byte data groups in the observation having an indicator value greater than 4.

CONTROL SECTION (continued)

<u>OF BYTES</u>	<u>Description of the Elements and Comments</u>
<u>ROCOES</u>	
65-66	<u>CT</u> : Thermodynamic correction technique, according to WMO Code 0659 (Page 58).
67-68	<u>RM</u> : Type of rocket motor according to WMO Code 3644 (Page 67).
69-70	<u>A1</u> : Reason for no report and ground equipment utilized, according to WMO Code 0262 (Page 55).
71-72	<u>CV</u> : Wind correction technique according to WMO Code 0659 (Page 58).
73-74	<u>MR1</u> : Method of reducing thermodynamic data according to WMO Code 2649 (Page 65).
75-76	<u>MR2</u> : Method of reducing wind data according to WMO Code 2649 (Page 65).
77-78	<u>MAND DATA GRPS</u> (Mandatory Data Groups): A count of the 20-byte data groups in the observation having an indicator value of 9-10.
79-80	<u>ADD DATA GRPS</u> (Additional Data Groups): Contains zero since no additional-data groups are currently reported in ROCOES.

NOTE: The following additional kind-of-report data for ROCOES are located in a pseudo "data level" (bytes 81-100) with an indicator value of 9:

81-82	<u>IND</u> : Value is 9.
83-84	<u>ETET</u> : Type of thermodynamic-sensing equipment according to WMO Code 1005 (Page 61).
85-86	<u>EWLW</u> : Type of wind-sensing equipment according to WMO Code 1053 (Page 62).
87-100	<u>OPEN</u> : All bits on.

## DATA SECTION

The Data Section immediately follows the Control Section in format. It varies in length according to the number of data groups (levels) reported in the observation. Each data group begins with an indicator in the first two bytes. It is important to note that this indicator must be related to the type of observation. For example, data groups with indicator zero to four have different formats depending on whether the report is a RAOB or WINDS. Formats of the various group types are given below. Unless otherwise noted, each field is in binary notation.

<u>Field</u>	<u>Description of the Elements and Comments</u>
--------------	-------------------------------------------------

### Data Section, RAOES

RAOB Pressure Level.

IND: Value is:

- 0 = Surface-data level
- 1 = Mandatory-data level
- 2 = Significant-data level
- 3 = Not used
- 4 = Manually-inserted-data level

FRES (Pressure): In tenths of millibars (e.g., 1013.2 = 10132).

HEIGHT: In whole meters (signed field).

TEMP (Temperature): In tenths of degrees Kelvin (e.g., 275.2 = 2752).

DEW PT DEF (Dew-point Depression): In tenths of Kelvin degrees (e.g., 20.2 = 202).

OPLN: All bits on.

FLGS (Flag Bits): The four lowest-order (rightmost) bits of the field are used as flag bits. The remaining bits are set to zero. The four flags, reading from right to left are:

SFC flag - Turned on if the pressure and/or temperature at this level is invalidated, but the remaining part of the sounding is hydrostatically correct; turned off if the data passed validation.

Height flag - Turned on if height is recomputed, otherwise turned off.

Temperature flag - Turned on if temperature is recomputed, otherwise turned off.

Dew-point flag - Turned on if dew point is recomputed, otherwise turned off.

OPEN: All bits on.

NOTE: Since 1 Jan 73 the number of pressure levels per observation has been limited to 100.

---

RAOB Tropopause Level.

IND: Value is 5.

FRES (Pressure): In tenths of millibars (e.g., 1013.2 = 10132).

HEIGHT: In whole meters (signed field).

TEMP (Temperature): In tenths of degrees Kelvin (e.g., 275.2 = 2752).

DEW PT DEF (Dew-point Depression): In tenths of Kelvin degrees (e.g., 20.2 = 202).

DIR (Wind Direction): In whole degrees (true); variable = 990.



DATA SECTION (continued)

Field                      Description of the Element and Comments (continued)

---

RAOB Tropopause Level (continued).

SPD (Wind Speed): In tenths of meters per second (e.g., 54.2 = 542).

FLGS (Flag Bits): The four lowest-order (rightmost) bits of the field are used as flag bits. The remaining bits are off. The four flags, reading from right to left are:

SFC Flag - On if the pressure and/or temperature at this level is invalidated, but the remaining part of the sounding is hydrostatically correct; off if the data passed validation.

Height Flag - On if height is recomputed, otherwise off.

Temperature Flag - On if temperature is recomputed, otherwise off.

Dew-point Flag - On if dew point is recomputed, otherwise off.

OPEN: All bits on.

---

RAOB Cloud Data.

IND: Value is 7.

Nh: The fraction of the celestial dome covered by low or middle clouds, given in eighths where 9 = obscured (EBCDIC).

CL: The type of low clouds according to WMO Code 0513 (Page 57), (EBCDIC).

H: The height of the low or middle cloud layer according to WMO Code 1600 (Page 62), (EBCDIC).

CM: The type of middle clouds according to WMO Code 0515 (Page 58), (EBCDIC).

CH: The type of high clouds according to WMO Code 0509 (Page 56), (EBCDIC).

OPEN: All bits on.

---

RAOB Stability Index.

IND: Value is 9.

SHOW STAB INDX (Showalter Stability Index): The possible values are 00-99 as follows:

0 = +0 or -0  
1 thru 40 = +1 thru +40  
41 thru 50 = Not used  
51 thru 90 = -1 thru -40  
91 thru 98 = Not used  
99 = Value not obtainable

SWEAT INDEX: A distinct number equal to or greater than zero.

OPEN: All bits on.

FLG (Flag): Only the low-order (rightmost) bit is used. The remaining bits are off. The meaning of the flag is:

0 = Stability index is reported  
1 = Stability index is computed

OPEN: All bits on.

---

Field                      Description of the Elements and Comments      (continued)

---

RAOB Thickness/Thermal Wind.

IND: Value is:

- 11 = 1000-700 millibar layer
- 12 = 1000-500 millibar layer
- 13 = 500-300 millibar layer

OPEN: All bits on.

THICKNESS: In decameters.

DIR (Thermal Wind Direction): In whole degrees (true).

SFD (Thermal Wind Speed): In tenths of meters per second (e.g., 24.2 = 242).

OPEN: All bits on.

---

RAOB Precipitable Water/Saturation Moisture Ratio.

IND: Value is 14.

PRECIP WT (Precipitable Water): In millimeters.

SAT MOIST RAT (Saturation Moisture Ratio): In percentages.

OPEN: All bits on.

---

RAOB Turbulence.

IND: Value is 15. The four fields (A, B, C and D) in this group represent threshold values for forecasting turbulence. Their contents are interpreted as follows:

- 0 = This parameter could not be checked
- 1 = Not used
- 2 = Does not indicate turbulence
- 3 = Indicates turbulence

A: Lapse rate change greater than 0.009, 700-150 millibars.

B: Vertical wind shear equal to or greater than 5 knots per 1000 feet, 700-150 millibars.

C: Dew-point depression equal to or less than 3°C, 700-300 millibars.

D: Showalter stability index equal to or less than zero.

---

Data Section, WINDS

WINDS Data Level.

IND: Value is:

- 0 = Surface-data level
- 1 = Mandatory-data level
- 2 = Significant-data level
- 3 = Not used
- 4 = Manually-inserted-data level

PRES (Pressure): In tenths of millibars (e.g., 1013.2 = 10132).

HEIGHT: In whole meters (signed field).

DATA SECTION (continued)

Field	Description of the Elements and Comments (continued)
-------	------------------------------------------------------

WINDS Data Level (continued).

FLG (Flag Bits): The three lowest-order (rightmost) bits of the field are used as flag bits. The remaining bits are set to zero. From right to left the flags are:

SFC flag - Turned on if the level is invalidated but the remaining part of the sounding is hydrostatically correct; turned off if the data passed validation.

STD flag - Turned on if standard atmosphere heights are assigned; turned off if heights are reported or computed.

Height flag - Turned on if height has been recomputed; turned off if height is reported.

OPEN: All bits on.

DIR (Wind Direction): In whole degrees (true).

SPD (Wind Speed): In tenths of meters per second (e.g., 25.4 = 254).

OPEN: All bits on.

---

WINDS Maximum Wind Level.

IND: Value is 6.

PRES (Pressure): In tenths of millibars (e.g., 1013.2 = 10132).

HEIGHT: In whole meters (signed field).

FLG (Flag Bits): The four lowest-order (rightmost) bits of the field are used as flag bits. The remaining bits are set to zero. From right to left the flags are:

Term flag - Turned on if the maximum wind level is a report terminating level; otherwise turned off.

R/C flag - Turned on if the maximum wind is computed; turned off if the maximum wind level is reported.

Pressure flag - Turned on if pressure is recomputed; otherwise turned off.

Height flag - Turned on if height is recomputed; otherwise turned off.

OPEN: All bits on.

DIR (Wind Direction): In whole degrees (true).

SPD (Maximum Wind Speed): In tenths of meters per second (e.g., 25.4 = 254).

VAVA: Absolute vector difference between the wind at the maximum wind level and the wind 3000 feet above the maximum wind level in tenths of meters per second (e.g., 10.2 = 102).

VBVB: Absolute vector difference between the wind at the maximum wind level and the wind 3000 feet below the maximum wind level in tenths of meters per second (e.g., 10.3 = 103).

---

Field                      Description of the Elements and Comments (continued)

---

WINDS Mean Wind Level:

IND: Value is 8.

OPEN: All bits on.

DIR (Wind Direction): In whole degrees (true).

SPD (Wind Speed): In tenths of meters per second (e.g., = 25.4 = 254).

LVL (Level): Denotes the mean wind layers as follows:

- 1 = Surface to 5000 feet
- 2 = 5000 feet to 10000 feet

OPEN: All bits on.

---

Data Section, ROCOBS

ROCOB Kind-of-Report Extension.

INL: Value is 9 (see Control Section, Page 28, for format).

---

ROCOB Data Level.

IND: Value is 10.

OPEN: All bits on.

HEIGHT: In hectometers.

TEMP (Temperature): In tenths of degrees Kelvin (e.g., 275.2 = 2752).

PRESS (Pressure): All bits on.

DIR (Wind Direction): In whole degrees (true).

SPD (Wind Speed): In tenths of meters per second (e.g., 25.4 = 254).

D: A factor needed to properly locate the decimal point in the density.

DEN (Density): In grams per cubic meter x 10<sup>-D</sup>.



#### REMARKS SECTION

This section contains any part of the data transmission that was not recognized by AFGWC decoders (programmed routines) as belonging in the preceding sections; it includes plain-language remarks and garbled information. The format for each report type is as follows:

<u>Field</u>	<u>Description of the Elements and Comments</u>
--------------	-------------------------------------------------

ROCOB Remarks.

IND: Value is 60.

= Δ : An EBCDIC constant added for readability and programmer aid ( Δ is an EBCDIC blank).

OPEN: All bits on.

RMKS (Remarks): A variable number of six-byte groups in EBCDIC.

RMKS FILL (Remarks Fill): Two EBCDIC blanks used only if necessary to make the length of the Remarks Section a multiple of four bytes.

---

RACE Remarks.

IND: Value is 61.

= Δ : An EBCDIC constant added for readability and programmer aid ( Δ is an EBCDIC blank).

FLC (Flag Bits): The seven lowest-order (rightmost) bits of the field are used as flag bits. The remaining bits are set to zero. The flag bit is turned on to denote the report type from which the remarks came; otherwise the flag is turned off. From right to left the flags represent:

- S = SLAM
- RA = RAOE, part A
- RB = RAOE, part B
- RC = RAOE, part C
- RD = RAOE, part D
- DA = Dropsonde, part A
- DB = Dropsonde, part B

RMKS (Remarks): A variable number of six-byte groups in EBCDIC.

RMKS FILL (Remarks Fill): Two EBCDIC blanks used only if necessary to make the length of the Remarks Section a multiple of four bytes.

---

REMARKS SECTION (continued)

Field	Description of the Elements and Comments (continued)
-------	------------------------------------------------------

WINDS Remarks.

IND: Value is 62.

= Δ: An EBCDIC constant added for readability and programmer aid ( Δ is an EBCDIC blank).

FLG (Flag Bits): The five lowest-order (rightmost) bits of the field are used as flag bits. The remaining bits are set to zero. The flag bit is turned on to denote the report type from which remarks came; otherwise the flag bit is turned off. From right to left the flags represent:

SDW = Satellite derived winds

PA = Winds, part A

PB = Winds, part B

PC = Winds, part C

PD = Winds, part D

RMKS (Remarks): A variable number of six-byte groups in EBCDIC.

RMKS FILL (Remarks Fill): Two EBCDIC blanks used only if necessary to make the length of the Remarks Section a multiple of four bytes.

## Appendix C

### DATSAV AIRCRAFT FILE CONSTRUCTION AND FORMAT

#### DATSAV Aircraft File Construction

DATSAV Aircraft is the term used at USAFETAC to reference the DATA SAVL Aircraft Data Set in the eight-bit byte format. The DATSAV Aircraft File consists of blocked variable-length records. The maximum length of a data record is 2500 bytes and the maximum length of a block is 9990 bytes.\* There are no header or trailer records. The file is recorded on 9-track tape at 1600 EPI recording density. Each 2400-foot tape contains a maximum of 3800 blocks of data. The remainder of each tape is reserved as an unused buffer area to facilitate reel-to-reel data base compatibility with CL-A. The sequence of the file is ELKSTN-YR-MO-DA-HR-MI-LAT-LON-TYPE REPORT-CE TYPE, where ELKSTN is always all bits on. Following are some general comments about the file construction:

a. The format is designed so that 32-bit binary fields are word aligned and 16-bit binary fields are half-word aligned. This format assumes that field C01 is word aligned in core.

b. Each field is in either 16-bit binary, 32-bit binary, or EBCDIC notation. Unless otherwise specified, each field is recorded in binary.

c. Unless otherwise noted, when data are missing from a field, all bits in that field are turned on.

d. Fields designated as "Open" contain all bits on.

e. CAUTION must be exercised in determining the true value of negative binary fields. If you are using DATSAV on a machine using two's complement arithmetic, you must add one to the value obtained when accessing DATSAV.

#### DATSAV Aircraft Format Explanation

The DATSAV Aircraft format explanation is divided into four sections: Control, Mandatory Data, Additional Data, and Remarks. The Control Section is fixed in format and length whereas the other sections are expandable by the nature of their design. Each section is more fully described in the detailed format description.

All WMO Codes referenced in this Appendix are reproduced in Appendix D to this handbook. The user can also find the explanation of these codes in the WMO Manual on Codes, No. 9,\*\* or AWSM 105-24.\*\*\*

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\* Each block of data is preceded by one 32-bit word containing the block length in the leftmost half-word; the rightmost half-word may contain any value.

\*\* World Meteorological Organization, Manual on Codes, Vol I, WMO No. 9, Geneva, Switzerland, 1972.

\*\*\* U.S. Air Force, Air Weather Service, Meteorological Codes, AWSM 105-24, Vol III, 16 Jan 75.

# CONTROL SECTION

FIELD NO.	C01	C02	C03	C04	C05	C06	C07	C08	C09	C10	C11	C12	C13	C14	C15	C16	C17	OPEN
NAME	REC LRG BYTES	ADD DATA BYTES	RMKS BYTES	OPEN	YR	MO	DA	HR	MI	TYPE RPT	OB TYPE	LAT	LOM	ACFT ALT	SWC RGN	AIRCRAFT IDENTIFIER	TRANS SITE IDENT	OPEN
VALUE	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
LOCATION	1 2 4 6 8	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

# MANDATORY DATA SECTION

FIELD NO.	MANDATORY DATA SECTION													ADDITIONAL DATA BEGINS HERE	OPEN	
	M01	M02	M03	M04	M05	M06	M07	M08	M09	M10	M11	M12	M13			
NAME	WINDS			PRES LVL	USE OF	ALT D	FLGT LVL	FLGT D	ALT LVL	TURBULENCE	FREQ		INTER	TYPE	OPEN	
	REL	TYPE	DIR								SPD	PL				
VALUE																
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
2	4	6	8	0	2	4	6	8	0	2	4	6	8	0	1	1

# ADDITIONAL DATA GROUPS

ADDITIONAL DATA GROUPS									
FIELD NO.	CONTRAILS				CLOUDS			GROUP FOR CLOUD & CONTRAIL DATA TYPE 2 GROUP REPEATED FOR EACH CLOUD LAYER	
	'2' IND	TYPE	LOC	AMT	TYPE	BASE	TOP	OPEN	
	0	0	0	0	0	1	1	1	
	1	2	4	6	8	0	2	4	6
NAME									
VALUE									
RELATIVE LOCATION									

# FIELD NO.

FIELD NO.		ICING				SUP DATA			GROUP FOR ICING DATA																
NAME	VALUE	'3' IND	BEG	END	RATE	TYPE	BASE	TOP	OPEN																
0	0	0	0	0	0	0	1	1	1																
1	2	4	6	8	0	0	2	4	6																
RELATIVE		LOCATION																							

Figure C-1. DATSAV Aircraft Format for IBM 360/44.



[illegible][illegible][illegible][illegible]

Figure C-1. DATSAV Aircraft Format for IBM 360/44 (Continued).

# ADDITIONAL DATA GROUPS (CON'T)

FIELD NO.	SFC		ALT		ACFT		GROUP FOR MISCELLANEOUS DATA															
NAME	IND	PRES	SUB	SCAL	NOBS	OPEN																
VALUE																						
RELATIVE LOCATION																						
0	0	0	0	0	0	0																
1	2	4	0	0	0	0																
2																						

FIELD NO.	IND		DEVIATION		TEMP		WIND		GROUP FOR DEVIATIONS															
NAME	IND	BITS	IND	TEMP	YRAG	YDIR	WSPD	WDIR																
VALUE																								
RELATIVE LOCATION																								
0	0	0	0	0	0	0	0	0																
1	2	4	0	0	0	0	0	0																
2																								

FIELD NO.	IND		A		OPEN		GROUP FOR RECO R VALUES															
NAME	IND	VALUE	IND	VALUE	IND	VALUE																
RELATIVE LOCATION																						
0	0	0	0	0	0	0																
1	2	4	0	0	0	0																
2																						

# AIRCRAFT REMARKS SECTION

FIELD NO.	IND		A		RMES 1		RMES 2		RMES 3		RMES N		RMES FILL	
NAME	IND	VALUE	IND	VALUE	IND	VALUE	IND	VALUE	IND	VALUE	IND	VALUE	IND	VALUE
RELATIVE LOCATION														
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	2	4	0	0	0	0	0	0	0	0	0	0	0	0
2														

Figure C-1. DATSAV Aircraft Format for IBM 360/44 (Continued).

# CONTROL SECTION

This section contains fields that are pertinent to the time and type of the observation and the identification and location of the report. See CAUTION in Item 5, Page 37. Refer to Figure C-1, Pages 38-40.

<u>Field</u>	<u>Description of the Element and Comments</u>
C01	<u>REC LNG BYTES</u> (Record-Length Bytes): The two leftmost bytes constitute a binary field containing a count of the total bytes in the record; the count must be evenly divisible by four. The two rightmost bytes are EBCDIC blanks.
C02	<u>ADD DATA BYTES</u> (Additional-Data Bytes): A count of the total number of bytes in the Additional-Data Section; the count must be evenly divisible by 16.
C03	<u>RMKS BYTES</u> (Remarks Bytes): A count of the total number of bytes in the Remarks Section; the count must be evenly divisible by four.
C04	<u>OPEN</u> : An open field with all bits on.
C05	<u>Yk</u> (Year): The last two digits of the year.
C06	<u>MC</u> (Month): 1-12
C07	<u>DA</u> (Day): 1-31
C08	<u>HR</u> (hour): 0-23
C09	<u>MIN</u> (Minutes): 0-59
C10	<u>TYPE RPT</u> (Type Report): 8 = Aircraft 9 = MAC-Abbreviated Spot Wind
C11	<u>OB TYPL</u> (Observation Type): 0 = Not used 1 = AWS RECCO 2 = Other RECCO 3 = COMBAR 4 = MAC Abbreviated 5 = CODAR 6 = ICAO 7 = SAC Low-Level (not currently used) 8 = Plain-Language Firep (not currently used)
C12	<u>LAT</u> (Latitude): In degrees and minutes (e.g., 25°16'N is stored as 2516); south latitudes are negative.
C13	<u>LCN</u> (Longitude): In degrees and minutes (e.g., 105°59'W is stored as 10559); east longitudes are negative.
C14	<u>ACFT ALT</u> (Aircraft Altitude): In whole meters above mean sea level except for CODAR reports which are in whole millibars.
C15	<u>GWC RGN</u> (AFGWC Region): A number (0-81) giving the geographical location of the report according to a fixed grid maintained at AFGWC (Figure D-1, Page 53, and Figure D-2, Page 54).

CONTROL SECTION (continued)

<u>Field</u>	<u>Description of the Element and Comments (continued)</u>
C16	<u>AIRCRAFT IDENTIFIER:</u>

a. AWS RECCC = RRPPNN where:

(1) RR represents the first two letters of the squadron call sign and will be given in EBCDIC characters:

GU = Gull  
LA = Lark  
LO = Loon  
RO = Robin  
SN = Snipe  
ST = Stork  
SW = Swan

(2) PP represents the cataloged track name and will be given in EBCDIC characters:

A = Alpha  
B = Bravo  
C = Charlie  
D = Delta  
E = Echo  
F = Foxtrot  
G = Golf  
H = Hotel  
I = India  
J = Juliet  
K = Kilo  
L = Lima  
M = Mike  
N = November  
O = Oscar  
P = Papa  
S = Special (SPL)

(3) NN is the RECCO observation number and will be a distinct EBCDIC number:

(I) OE 1 = 01  
(II) OB 2 = 02

(4) Exception: If a cataloged route/track is found, then PF = ~~W~~T, where ~~W~~ is a blank and T is the first letter or numeric of the cataloged track. If a cataloged track is not found, then PF = the left two alphanumeric characters of the last word in the route/track word group. For example:

Robin Alpha	OE 1 = RO <del>W</del> A01
Robin 41	OE 6 = RO4106
Gull Alpha Clga	OE 7 = GUOL07
Gull Clga	OE 2 = GUOL02

b. Other RECCO: The entire word will be blank-filled.

c. COMBAR and CCDAR: The entire word will be zero-filled.



Field

Description of the Elements and Comments (continued)

d. MAC Abbreviated: A six-digit field giving the aircraft tail number (Ø denotes a blank). For example:

(1) If a three-digit or five-digit aircraft tail number is received, the number will be left-adjusted and blank-filled. This EBCDIC word will be stored:

736 = 736ØØØ  
53124 = 53124Ø

(2) If a tail number longer than six characters is received, only the leftmost six characters will be stored:

1234567 = 123456

(3) If the tail number is garbled or missing, this word will be blank-filled.

e. ICAO: These reports are identified by a combination of six alpha-numeric characters (Ø denotes a blank). For example:

(1) If the identifier is less than six characters long, this word will be stored:

ØA105 = ØA105Ø

(2) If the identifier is more than six characters long, only the first six characters will be stored:

JAL1059 = JAL105

(3) If the identifier is garbled or missing, this word will be blank-filled.

C17

TRANS SITE IDENT (Transmission Site Identifier): The four-character ICAO identifier for the transmission site.

# MANDATORY DATA SECTION

The Mandatory-Data Fields are always included in the format in their fixed location although their data are sometimes missing from the observation.

<u>Field</u>	<u>Description of the Elements and Comments</u>
M01	<u>REL</u> (Wind Reliability): Given only for RECCO reports according to RECCO Code Table 4-3 (Page 74); all other reports will be set missing.
M02	<u>TYPE</u> (Wind Type): Represents the method by which the wind was determined as follows:

- 0 = Spot wind
- 1 = Winds averaged over 100 nautical miles, last fix 25 miles from this position
- 2 = Winds averaged over 200 nautical miles, last fix 25 miles from this position
- 3 = Winds averaged over 300 nautical miles, last fix 25 miles from this position
- 4 = Winds averaged over 400 nautical miles, last fix 25 miles from this position
- 5 = Winds averaged over 100 nautical miles, last fix 75 miles from this position
- 6 = Winds averaged over 200 nautical miles, last fix 75 miles from this position
- 7 = Winds averaged over 300 nautical miles, last fix 75 miles from this position
- 8 = Winds averaged over 400 nautical miles, last fix 75 miles from this position
- 9 = Winds averaged over more than 400 nautical miles

NOTE: Combar 0 = Doppler or radar; COMBAR 1 = fix-to-fix using visual, radar, celestial, or Loran fixes or other.

M03	<u>DIR</u> (Wind Direction): Given in degrees (true) 0-360; calm = 0 and variable = 99.
M04	<u>SPL</u> (Wind Speed): Given in tenths of meters per second (e.g., 25.2 = 252); calm = 0.
M05	<u>FRES LVL ASCN</u> (Pressure-Level Assignment (PLA)): PLA represents, in whole millibars, the mandatory-pressure level to which the aircraft report is assigned. The conversion of flight altitudes to pressure levels is as follows:

Flight Altitude (1000 feet MSL)      Mandatory-Pressure Level (millibars)

1 ~ 3	N/A
4 ~ 7	850
8 ~ 13	700
14	N/A
15 ~ 21	500
22 ~ 26	400
27 ~ 32	300
33 ~ 36	250
37 ~ 42	200
43 ~ 48	150
49 ~ 56	100
57 ~ 63	070
64 ~ 71	050
72 ~ 74	N/A
75 ~ 81	030
82 ~ 83	N/A
84 ~ 90	020
91 ~ 97	N/A
98 ~ 104	010

NOTE: For CCDAK reports (flight level given in millibars) the pressure-level assignment will be the nearest mandatory pressure to the aircraft's flight-level pressure.

<u>Field</u>	<u>Description of the Element and Comments (continued)</u>
M06	<p><u>USE OF AK</u> (Usability of Aerial Refueling): This value represents the usability of refueling altitudes at the location of the aircraft report as follows:</p> <p>a. For COMBAK Reports:</p> <ul style="list-style-type: none"> <li>1 = Fair</li> <li>2 = Poor</li> <li>3 = Missing</li> </ul> <p>b. For COLAK Reports this field represents type of temperature and height data according to WMO Code 3738 (Page 67).</p> <p>c. All other reports are set missing.</p>
M07	<u>ALT D VAL</u> (Altitude Departure Value (D-Value)): The departure of true altitude above MSL from the pressure altitude of the same point in space, given in whole meters; negative values are signed negative.
M08	<u>FLT LVL TEMP</u> (Flight-Level Temperature): In tenths of degrees Kelvin (e.g., 273.2 = 2732).
M09	<u>FLT LVL LPD</u> (Flight-Level Dew-Point Depression): In tenths of Kelvin degrees (e.g., 22.5 = 225).
M10	<u>ALT CF FL</u> (Altitude of Mandatory-Pressure Level): Only in RECCO reports in units of whole meters; may be negative if 1000- or 850-millibar pressure level is below ground.
M11	<p><u>FRLQ</u> (Frequency of Turbulence):</p> <ul style="list-style-type: none"> <li>0 = Not reported</li> <li>1 = Infrequent</li> <li>2 = Frequent</li> <li>3 = Occasional</li> <li>4 = Intermittent</li> <li>5 = Continuous</li> </ul>
M12	<p><u>INTEN</u> (Intensity of Turbulence):</p> <ul style="list-style-type: none"> <li>0 = None</li> <li>1 = Light</li> <li>2 = Light-moderate</li> <li>3 = Moderate</li> <li>4 = Moderate-severe</li> <li>5 = Severe</li> <li>6 = Severe-extreme</li> <li>7 = Extreme</li> <li>8 = None reported (ICAO)</li> </ul>
M13	<p><u>TYPE</u> (Type of Turbulence):</p> <ul style="list-style-type: none"> <li>0 = Not reported</li> <li>1 = In clouds</li> <li>2 = Clear air turbulence</li> </ul>

#### ADDITIONAL DATA SECTION

This section is composed of a variable number of groups. Each group is 16 bytes long and is identified by the indicator field. There may be multiple groups of the same type (identical indicator) in a single aircraft report. Additional data groups are included only as data are available. Formats of the various group types are indicated below. Unless otherwise noted, each field is in binary notation.

<u>Field</u>	<u>Description of the Elements and Comments</u>
--------------	-------------------------------------------------

Group Type 02, Cloud and Contrail Data.

IND: Value is 2.

TYPE (Contrail Type): Coded as follows (RECCO and COMBAR only):

- 0 = None
- 1 = Non-persistent
- 2 = Persistent
- 3 = Not reported

LOC (Contrail Location): Coded as follows (COMBAR only):

- 0 = Not reported
- 1 = Above flight level
- 2 = At flight level
- 3 = Below flight level

AMT (Cloud Amount): A distinct number in accordance with WMO Code 2700 (Page 66).

TYPE (Cloud Type): A distinct number in accordance with WMO Code 0500 (Page 55).

No clouds = 10

BASE (Cloud Base): In decameters.

TOP (Cloud Top): In decameters.

---

Group Type 03, Icing Data.

IND: Value is 3.

BEG (Begin Icing): Coded in accordance with RECCO Code Table 4-13 (Page 76).

END (End Icing): Coded in accordance with RECCO Code Table 4-13 (Page 76).

RATE (Rate of Icing):

- 0 = 2 millimeters per minute
- 1 = 2-5 millimeters per minute
- 2 = 6-10 millimeters per minute
- 3 = 11-15 millimeters per minute
- 4 = 16-20 millimeters per minute
- 5 = 21-25 millimeters per minute
- 6 = Over 25 millimeters per minute
- 7 = Light
- 8 = Moderate
- 9 = Heavy (or severe)
- 10 = None
- 11 = Trace
- 12 = Hail
- 13 = No report available



Field                      Description of the Elements and Comments      (continued)

---

TYPE (Type of Icing): Coded in accordance with KECCO Code Table 4-7 (Page 74).

BASE (Base of Icing): In whole decameters.

TOP (Top of Icing): In whole decameters.

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Group Type 04, In-Flight and Off-Course Weather.

IND: Value is 4.

AUX IND (Auxiliary Ind):

- 0 = Basic group format
- 1-3 = Supplementary group format

FLT COND (Flight Condition):

- 0 = Total amount of cloud less than 1/8
- 1 = Total cloud amount at least 1/8, with either 1/8 - 4/8 above or 1/8 - 4/8 below, or combinations thereof
- 2 = Cloud amount more than 4/8 above and 0 - 4/8 below
- 3 = Cloud amount 0 - 4/8 above and more than 4/8 below
- 4 = Cloud amount more than 4/8 above and more than 4/8 below
- 5 = Chaotic sky - many undefined layers
- 6 = In and out of clouds, on instruments 25 percent of time
- 7 = In and out of clouds, on instruments 50 percent of time
- 8 = In and out of clouds, on instruments 75 percent of time
- 9 = In clouds all of the time, continuous instrument flight
- 10 = Clear
- 11 = Above clouds (tops less than 3000 meters)
- 12 = Above clouds (tops 3000 - 5500 meters)
- 13 = Above clouds (tops above 5500 meters)
- 14 = Below clouds (bases less than 3000 meters)
- 15 = Below clouds (bases 3000 - 5500 meters)
- 16 = Below clouds (bases above 5500 meters)
- 17 = Between broken or overcast layers
- 18 = In clouds
- 19 = In and out of clouds

FLT VSBY (Flight Visibility):

- 0 = Not used
- 1 = Poor (less than 1.85 kilometers)
- 2 = Fair (1.85 - 5.5 kilometers)
- 3 = Good (greater than 5.5 kilometers)
- 4 = Not reported

FLT WX (Flight Weather):

- 0 = Clear (at least at flight level)
- 1 = Partly cloudy (scattered or broken)
- 2 = Continuous layer(s) of cloud(s)
- 3 = Sandstorm, duststorm, or storm of drifting snow
- 4 = Fog, thick dust, or haze
- 5 = Drizzle
- 6 = Rain
- 7 = Snow or rain and snow mixed
- 8 = Shower(s)
- 9 = Thunderstorm(s)
- 10 = Lightning
- 11 = Scattered clouds
- 12 = Broken clouds

ADDITIONAL DATA SECTION (continued)

Field                      Description of the Element and Comments (continued)

RMKS (Remarks): Coded in accordance with RECCO Code Table 4-11 (Page 75).

WS (Significant Weather Changes): Coded in accordance with RECCO Code Table 4-16 (Page 77).

SS (Distance of Occurrence of Significant Weather Changes): Coded in accordance with RECCO Code Table 4-13 (Page 76).

WC (Off-Course Weather): Coded in accordance with RECCO Code Table 4-15 (Page 77).

DW (Bearing of Off-Course Weather): Coded in accordance with RECCO Code Table 4-2 (Page 73).

SKY CCV (Sky Cover): Coded as follows (for data reported in COMEAK):

- 0 = Clear
- 1 = Scattered
- 2 = Broken
- 3 = Overcast

HGT (Height): Coded as follows (for data reported in COMEAK):

- 0 = Below flight level
- 1 = At flight level
- 2 = Above flight level

---

Group Type 05, Surface Data.

IND: Value is 5.

DK (Direction of Swell): Coded in accordance with RECCO Code Table 4-2 (Page 73).

S (State of Sea): Coded in accordance with WMO Code 3700 (Page 67).

DIR (Wind Direction): In tens of degrees. Wind Direction may be reported as one of eight points of the compass; if so, it will be coded as below:

<u>Code Figure</u>	<u>Reported Direction</u>	<u>Assignment</u>
0	calm	00
1	NE	05
2	E	09
3	SE	14
4	S	18
5	SW	23
6	W	27
7	NW	32
8	N	36
9	-	63

Field                      Description of the Element and Comments (continued)

SFD (Wind Speed): In knots. Wind speeds less than 48 knots may be reported as a coded RECCO value as specified below:

<u>Code Figure</u>	<u>Reported Speed (knots)</u>	<u>Assignment (knots)</u>
0	calm	0
1	1-3	2
2	4-6	5
3	7-10	9
4	11-16	14
5	17-21	19
6	22-27	25
7	28-33	31
8	34-40	37
9	41-47	44

Group Type 06, Radar Data.

IND: Value is 6.

DRDR: Bearing of echo center from aircraft in degrees (true).

CE (Character of Echo): Coded in accordance with RECCO Code Table 4-1 (Page 73).

I (Intensity of Echo): Coded in accordance with RECCO Code Table 4-9 (Page 75).

CE (Orientation of the Ellipse): Coded in accordance with RECCO Code Table 4-12 (Page 76).

SK (Distance to Echo Center): In whole kilometers.

WE (Ellipse Width or Echo Diameter): In whole kilometers.

AE (Length of Major Axis): In whole kilometers.

Group Type 07, Miscellaneous Data.

IND: Value is 7.

SFC PRES (Surface Pressure): In whole millibars (RECCO only).

ALT SUE SCAL (Altimeter Sub-Scale): In whole millibars (RECCO only).

ACFT HENG (Aircraft Heading): In tens of degrees magnetic (COMEAR only).

ADDITIONAL DATA SECTION (continued)

Field      Description of the Element and Comments (continued)

Group Type 08, Deviations.

IND: Value is 8.

IND BITS (Indicator Bits): The six low-order bits of the field are set left to right in accordance with A through F below:

- A    Not used
- B    0 = Wind vector magnitude deviation did not exceed throw criteria  
      1 = Wind vector magnitude deviation exceeded throw criteria
- C    0 = Temperature deviation did not exceed throw criteria  
      1 = Temperature deviation exceeded throw criteria
- D    0 = Height deviation did not exceed throw criteria  
      1 = Height deviation exceeded throw criteria
- E    0 = Deviations computed from JULHR-6 analysis/forecast cycle  
      1 = Deviations computed from JULHR-18 Analysis/forecast cycle

NOTE: If "F" (below) = zero, this bit is meaningless

- F    0 = Ease time of data 00Z or 12Z  
      1 = Base time of data 06Z or 18Z

HCT (Height Deviation): The difference between reported and interpolated forecast values in whole meters.

TEMP (Temperature Deviation): The difference between reported and interpolated forecast values in tenths of degrees Kelvin (e.g., 25.2 = 252).

VMAG (Wind-Vector Magnitude Deviation): The magnitude of the wind vector difference between the reported and interpolated forecast wind in whole meters per second.

VDIR (Direction of Wind-Deviation Vector): In whole degrees.

WSPD (Wind-Speed Deviation): The scalar difference between the reported and interpolated forecast wind-speed values in whole meters per second.

WDIR (Wind-Direction Deviation): The scalar difference between the reported wind direction and the interpolated forecast wind direction in whole degrees; this value may be positive or negative (+ or - 180).

---

Group Type 09, RECCO "R" Values.

IND: Value is 9.

A (RECCO R Values): Stored as received (0-99) in EBCDIC.

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#### REMARKS SECTION

This section contains any part of the data transmission that was not recognized by the AFGWC decoders (programmed routines) as belonging in the preceeding sections.

<u>Field</u>	<u>Description of the Elements and Comments</u>
--------------	-------------------------------------------------

<u>IND:</u>	Value is 63.
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<u>RMKS</u> (Remarks):	A variable number of EPCDIC characters.
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<u>RMKS FILL</u> (Remarks Fill):	EPCDIC blanks to cause total length of the section to be a multiple of four bytes.
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Appendix D  
WMO CODES AND RECCO CODE TABLES

AFGWC Region Numbers

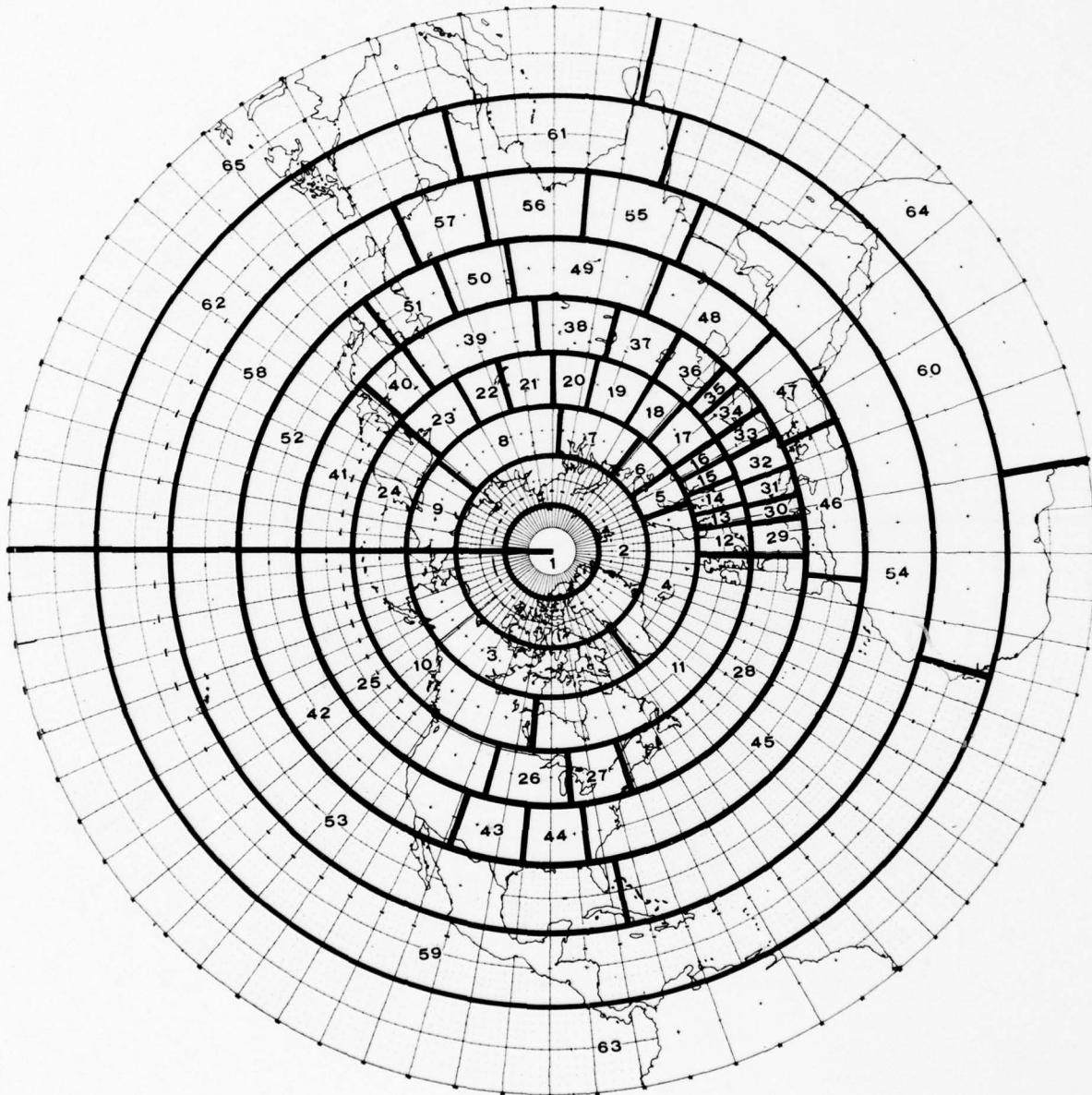


Figure D-1. AFGWC Region Numbers for Northern Hemisphere.

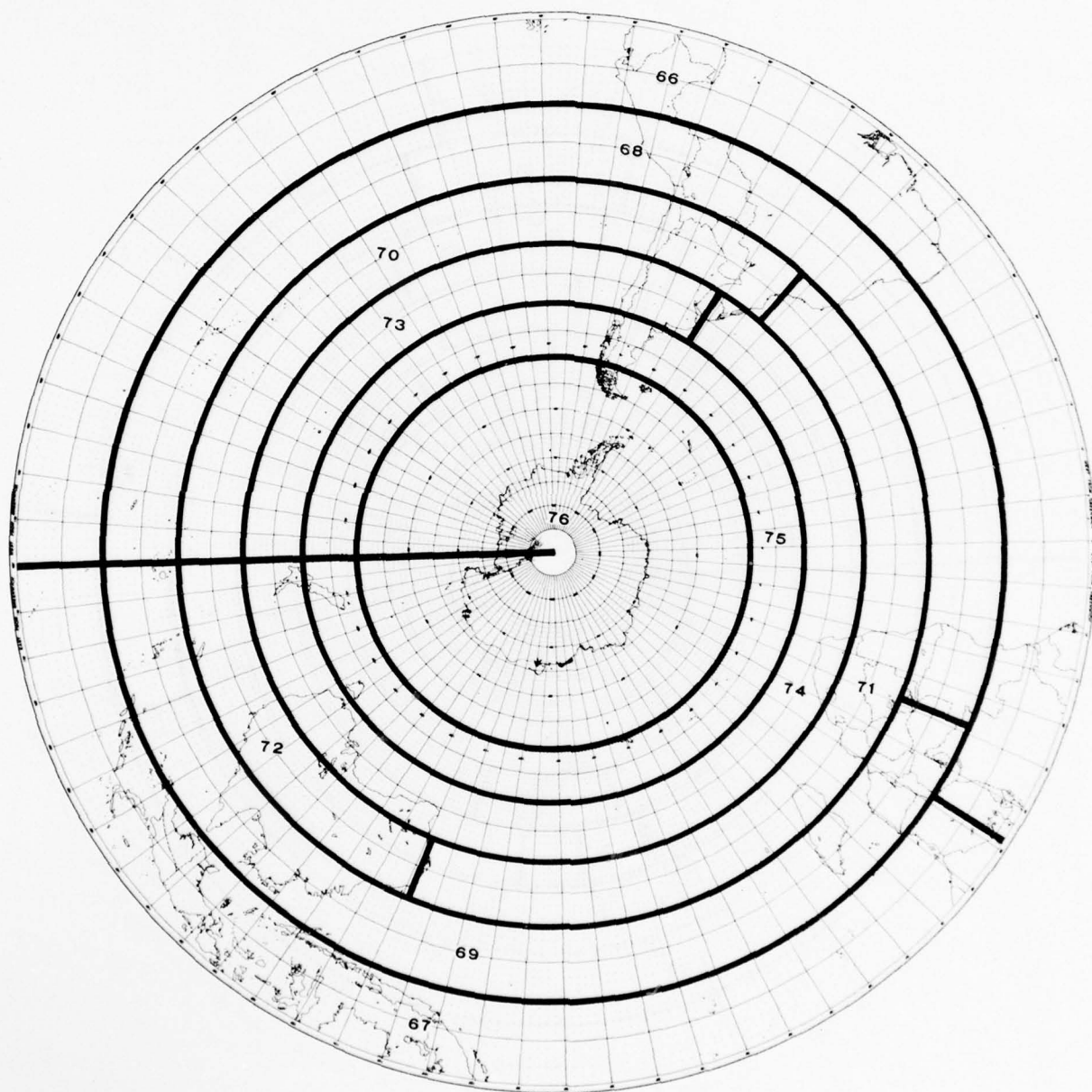


Figure D-2. AFGWC Region Numbers for Southern Hemisphere.

## 0200

a — *Characteristic of pressure tendency during the three hours preceding the time of observation*

Code figure

0	Increasing, then decreasing; atmospheric pressure the same or higher than 3 hours ago	
1	Increasing, then steady; or increasing, then increasing more slowly	atmospheric pressure now higher than 3 hours ago
2	Increasing (steadily or unsteadily)	
3	Decreasing or steady, then increasing; or increasing, then increasing more rapidly	
4	Steady; atmospheric pressure the same as 3 hours ago	
5	Decreasing, then increasing; atmospheric pressure the same or lower than 3 hours ago	
6	Decreasing, then steady; or decreasing, then decreasing more slowly	atmospheric pressure now lower than 3 hours ago
7	Decreasing (steadily or unsteadily)	
8	Steady or increasing, then decreasing; or decreasing, then decreasing more rapidly	

## 0262

a<sub>1</sub> — *Reason for no report and ground equipment employed*

Code figure

Code figure	Reason for no report and ground equipment employed
0	Launch not scheduled
1	Rocket motor failure
2	Instrument (or) telemetry signal not received
3	Ground tracking equipment failure
4	Weather prohibited launch
5	Range restrictions prohibited launch
6	Lack of expandables prohibited launch
7	Radar only employed
8	Radar and telemetry equipment employed
9	Telemetry equipment only employed

Note: When a firing is made but data are not obtained, code figure from 0 through 6 as applicable shall be reported.

## 0265

a<sub>4</sub> — *Indicator specifying types of measuring equipment used*

Code figure

Code figure	Equipment
0	Pressure instrument associated with wind-measuring equipment
1	Optical theodolite
2	Radio theodolite
3	Radar
4	Pressure instrument associated with wind-measuring equipment but pressure element failed during ascent

Note: In the case of a<sub>4</sub> = 4, the group 55nP<sub>1</sub>P<sub>1</sub> in Section 2 of FM 32-V and FM 33-V shall be inserted in the report and the levels which follow shall be geopotential approximations of the standard surfaces.

## Code 0500

C — *Genus of cloud*

C' — *Genus of cloud whose base is below the level of the land station*

CC — *Genus of cloud in two letters*

Code figure	CC	Code figure	CC
0	Cirrus (Ci) . . . . . CI	5	Nimbostratus (Ns) . . . NS
1	Chorocumulus (Cc) . . . CC	6	Stratocumulus (Sc) . . . SC
2	Cirrostratus (Cs) . . . . CS	7	Stratus (St) . . . . . ST
3	Alto cumulus (Ac) . . . . AC	8	Cumulus (Cu) . . . . . CU
4	Altostratus (As) . . . . AS	9	Cumulonimbus (Cb) . . . CB
/	Cloud not visible owing to darkness, fog, duststorm, sandstorm, // or other analogous phenomena		

\* World Meteorological Organization, Manual on Codes, Vol. I, WMO No. 9, Geneva, Switzerland, 1972.



Code 0509

**C<sub>H</sub> — Clouds of the genera Cirrus, Cirrocumulus and Cirrostratus**

Code figure	Technical specifications	Code figure	Non-technical specifications
0	No C <sub>H</sub> clouds	0	No Cirrus, Cirrocumulus or Cirrostratus
1	Cirrus fibratus, sometimes uncinus, not progressively invading the sky	1	Cirrus in the form of filaments, strands or hooks, not progressively invading the sky
2	Cirrus spissatus, in patches or entangled sheaves, which usually do not increase and sometimes seem to be the remains of the upper part of a Cumulonimbus; or Cirrus castellatus or floccus	2	Dense Cirrus, in patches or entangled sheaves, which usually do not increase and sometimes seem to be the remains of the upper part of a Cumulonimbus; or Cirrus with sproutings in the form of small turrets or battlements, or Cirrus having the appearance of cumuliform tufts
3	Cirrus spissatus cumulonimbogenitus	3	Dense Cirrus, often in the form of an anvil, being the remains of the upper parts of Cumulonimbus
4	Cirrus uncinus or fibratus, or both, progressively invading the sky; they generally thicken as a whole	4	Cirrus in the form of hooks or of filaments, or both, progressively invading the sky; they generally become denser as a whole
5	Cirrus (often in bands) and Cirrostratus, or Cirrostratus alone, progressively invading the sky; they generally thicken as a whole, but the continuous veil does not reach 45 degrees above the horizon	5	Cirrus (often in bands converging towards one point or two opposite points of the horizon) and Cirrostratus, or Cirrostratus alone; in either case, they are progressively invading the sky, and generally growing denser as a whole, but the continuous veil does not reach 45 degrees above the horizon
6	Cirrus (often in bands) and Cirrostratus, or Cirrostratus alone, progressively invading the sky; they generally thicken as a whole; the continuous veil extends more than 45 degrees above the horizon, without the sky being totally covered	6	Cirrus (often in bands converging towards one point or two opposite points of the horizon) and Cirrostratus, or Cirrostratus alone; in either case, they are progressively invading the sky, and generally growing denser as a whole; the continuous veil extends more than 45 degrees above the horizon, without the sky being totally covered
7	Cirrostratus covering the whole sky	7	Veil of Cirrostratus covering the celestial dome
8	Cirrostratus not progressively invading the sky and not entirely covering it	8	Cirrostratus not progressively invading the sky and not completely covering the celestial dome
9	Cirrocumulus alone, or Cirrocumulus predominant among the C <sub>H</sub> clouds	9	Cirrocumulus alone, or Cirrocumulus accompanied by Cirrus or Cirrostratus, or both, but Cirrocumulus is predominant
/	C <sub>H</sub> clouds invisible owing to darkness, fog, blowing dust or sand, or other similar phenomena, or because of a continuous layer of lower clouds	/	Cirrus, Cirrocumulus and Cirrostratus invisible owing to darkness, fog, blowing dust or sand, or other similar phenomena, or more often because of the presence of a continuous layer of lower clouds

# Code 0513

## *C<sub>L</sub> — Clouds of the genera Stratocumulus, Stratus, Cumulus and Cumulonimbus*

Code figure	Technical specifications	Code figure	Non-technical specifications
0	No <i>C<sub>L</sub></i> clouds	0	No Stratocumulus, Stratus, Cumulus or Cumulonimbus
1	Cumulus humilis or Cumulus fractus other than of bad weather,* or both	1	Cumulus with little vertical extent and seemingly flattened, or ragged Cumulus other than of bad weather,* or both
2	Cumulus mediocris or congestus, with or without Cumulus of species fractus or humilis or Stratocumulus, all having their bases at the same level	2	Cumulus of moderate or strong vertical extent, generally with protuberances in the form of domes or towers, either accompanied or not by other Cumulus or by Stratocumulus, all having their bases at the same level
3	Cumulonimbus calvus, with or without Cumulus, Stratocumulus or Stratus	3	Cumulonimbus the summits of which, at least partially, lack sharp outlines, but are neither clearly fibrous (cirriform) nor in the form of an anvil; Cumulus, Stratocumulus or Stratus may also be present
4	Stratocumulus cumulogenitus	4	Stratocumulus formed by the spreading out of Cumulus; Cumulus may also be present
5	Stratocumulus other than Stratocumulus cumulogenitus	5	Stratocumulus not resulting from the spreading out of Cumulus
6	Stratus nebulosus or Stratus fractus other than of bad weather,* or both	6	Stratus in a more or less continuous sheet or layer, or in ragged shreds, or both, but no Stratus fractus of bad weather *
7	Stratus fractus or Cumulus fractus of bad weather,* or both (pannus), usually below Altostratus or Nimbostratus	7	Stratus fractus of bad weather * or Cumulus fractus of bad weather, or both (pannus), usually below Altostratus or Nimbostratus
8	Cumulus and Stratocumulus other than Stratocumulus cumulogenitus, with bases at different levels	8	Cumulus and Stratocumulus other than that formed from the spreading out of Cumulus; the base of the Cumulus is at a different level from that of the Stratocumulus
9	Cumulonimbus capillatus (often with an anvil), with or without Cumulonimbus calvus, Cumulus, Stratocumulus, Stratus or pannus	9	Cumulonimbus, the upper part of which is clearly fibrous (cirriform), often in the form of an anvil; either accompanied or not by Cumulonimbus without anvil or fibrous upper part, by Cumulus, Stratocumulus, Stratus or pannus
/	<i>C<sub>L</sub></i> clouds invisible owing to darkness, fog, blowing dust or sand, or other similar phenomena	/	Stratocumulus, Stratus, Cumulus and Cumulonimbus invisible owing to darkness, fog, blowing dust or sand, or other similar phenomena

\* "Bad weather" denotes the conditions which generally exist during precipitation and a short time before and after.

# Code 0515

## *C<sub>M</sub> — Clouds of the genera *Alto*cumulus, *Alto*stratus and *Nimbo*stratus*

Code figure	Technical specifications	Code figure	Non-technical specifications
0	No <i>C<sub>M</sub></i> clouds	0	No <i>Alto</i> cumulus, <i>Alto</i> stratus or <i>Nimbo</i> stratus
1	<i>Alto</i> stratus translucidus	1	<i>Alto</i> stratus, the greater part of which is semi-transparent; through this part the sun or moon may be weakly visible, as through ground glass
2	<i>Alto</i> stratus opacus or <i>Nimbo</i> stratus	2	<i>Alto</i> stratus, the greater part of which is sufficiently dense to hide the sun or moon, or <i>Nimbo</i> stratus
3	<i>Alto</i> cumulus translucidus at a single level	3	<i>Alto</i> cumulus, the greater part of which is semi-transparent; the various elements of the cloud change only slowly and are all at a single level
4	Patches (often lenticular) of <i>Alto</i> cumulus translucidus, continually changing and occurring at one or more levels	4	Patches (often in the form of almonds or fishes) of <i>Alto</i> cumulus, the greater part of which is semi-transparent; the clouds occur at one or more levels and the elements are continually changing in appearance
5	<i>Alto</i> cumulus translucidus in bands, or one or more layers of <i>Alto</i> cumulus translucidus or opacus, progressively invading the sky; these <i>Alto</i> cumulus clouds generally thicken as a whole	5	Semi-transparent <i>Alto</i> cumulus in bands, or <i>Alto</i> cumulus in one or more fairly continuous layers (semi-transparent or opaque), progressively invading the sky; these <i>Alto</i> cumulus clouds generally thicken as a whole
6	<i>Alto</i> cumulus cumulogenitus (or cumulonimbogenitus)	6	<i>Alto</i> cumulus resulting from the spreading out of Cumulus (or Cumulonimbus)
7	<i>Alto</i> cumulus translucidus or opacus in two or more layers, or <i>Alto</i> cumulus opacus in a single layer, not progressively invading the sky, or <i>Alto</i> cumulus with <i>Alto</i> stratus or <i>Nimbo</i> stratus	7	<i>Alto</i> cumulus in two or more layers, usually opaque in places, and not progressively invading the sky; or opaque layer of <i>Alto</i> cumulus, not progressively invading the sky; or <i>Alto</i> cumulus together with <i>Alto</i> stratus or <i>Nimbo</i> stratus
8	<i>Alto</i> cumulus castellanus or floccus	8	<i>Alto</i> cumulus with sproutings in the form of small towers or battlements, or <i>Alto</i> cumulus having the appearance of cumuliform tufts
9	<i>Alto</i> cumulus of a chaotic sky, generally at several levels	9	<i>Alto</i> cumulus of a chaotic sky, generally at several levels
/	<i>C<sub>M</sub></i> clouds invisible owing to darkness, fog, blowing dust or sand, or other similar phenomena, or because of a continuous layer of lower clouds	/	<i>Alto</i> cumulus, <i>Alto</i> stratus and <i>Nimbo</i> stratus invisible owing to darkness, fog, blowing dust or sand, or other similar phenomena, or more often because of the presence of a continuous layer of lower clouds

0659

*C<sub>T</sub> — Thermodynamic correction technique*

*C<sub>w</sub> — Wind correction technique*

Code figure	Specification
1	U.S. standard correction
2	U.K. standard correction
3	Japan standard correction
4-9	Unassigned
0	No correction applied

### Code 0663

*C<sub>2</sub> — Description of kind of ice*

Code  
figure

- 0 No ice (0 may be used to report ice *blink* and then a direction must be reported)
- 1 New ice
- 2 Fast ice
- 3 Pack-ice/drift-ice
- 4 Packed (compact) slush or sludge
- 5 Shore lead
- 6 Heavy fast ice
- 7 Heavy pack-ice/drift-ice
- 8 Hummocked ice
- 9 Icebergs \*

\* Icebergs can also be reported in plain language.

### Code 0700

*Direction or bearing in one figure*

- D — Direction of surface wind
- Direction from which waves are coming
- D<sub>K</sub> — Direction of swell
- D<sub>s</sub> — Ship's course (true) made good during the three hours preceding the time of observation
- Direction (true) of resultant displacement of the ship during the three hours preceding the time of observation
- D<sub>i</sub> — Direction of the point position from the station

Code  
figure

- 0 Calm (in D, D<sub>K</sub>), or stationary (in D<sub>s</sub>), or at the station (in D<sub>i</sub>)
- 1 NE
- 2 E
- 3 SE
- 4 S
- 5 SW
- 6 W
- 7 NW
- 8 N
- 9 All directions (in D<sub>i</sub>), or confused (in D(waves), D<sub>K</sub>), or variable (in D(wind)), or unknown (in D<sub>s</sub>)

### Code 0739

*D<sub>i</sub> — Bearing of ice edge*

Code  
figure

- 0 No ice edge can be stated
- 1 Ice edge towards NE
- 2 Ice edge towards E
- 3 Ice edge towards SE
- 4 Ice edge towards S
- 5 Ice edge towards SW
- 6 Ice edge towards W
- 7 Ice edge towards NW
- 8 Ice edge towards N
- 9 Ice edge in several directions

Note : If more than one ice edge can be stated, the nearest or most important should be reported.



### Code 0900

#### E — State of the ground

##### Code figure

- 0 Surface of ground dry (no appreciable amount of dust or loose sand)
- 1 Surface of ground moist
- 2 Surface of ground wet (standing water in small or large pools on surface)
- 3 Surface of ground frozen
- 4 Glaze or ice on ground, but no snow or melting snow
- 5 Snow or melting snow (with or without ice) covering less than one-half of the ground
- 6 Snow or melting snow (with or without ice) covering more than one-half of the ground but ground not completely covered
- 7 Snow or melting snow (with or without ice) covering ground completely
- 8 Loose dry snow, dust or sand covering more than one-half of ground (but not completely)
- 9 Loose dry snow, dust or sand covering ground completely

##### Notes:

- (1) Where dust or sand is reported and the temperature is below 0°C, the word DUST or SAND is added at the end of the report.
- (2) The definitions in the code for E for numbers 0 to 3 apply to representative bare ground and numbers 4 to 9 to an open representative area.
- (3) In all instances the highest code figures applicable are to be reported.

### Code 1000

#### • — Orientation of ice edge

##### Code figure

- 0 Orientation of ice edge impossible to estimate — ship outside the ice
- 1 Ice edge lying in a direction NE to SW with ice situated to the NW
- 2 Ice edge lying in a direction E to W with ice situated to the N
- 3 Ice edge lying in a direction SE to NW with ice situated to the NE
- 4 Ice edge lying in a direction S to N with ice situated to the E
- 5 Ice edge lying in a direction SW to NE with ice situated to the SE
- 6 Ice edge lying in a direction W to E with ice situated to the S
- 7 Ice edge lying in a direction NW to SE with ice situated to the SW
- 8 Ice edge lying in a direction N to S with ice situated to the W
- 9 Orientation of ice edge impossible to estimate — ship inside the ice

0101 — Type of thermodynamic sensing equipment

Code figure	Type of thermodynamic sensing equipment
00	No thermodynamic sensor
	01-49 Sonde
01	Arcasonde, experimental
02	Arcasonde 1A, thin film mount, 10 mil (Bt)
03	WOX1A and WOX4A, experimental
04	WOX1A, 10 mil (Bt)
05	WOX4A, 10 mil (Bt)
06	Walmet, thin film loop mount, 10 mil (Bt)
07	Sts, experimental (Bt)
08	Sts, thin film mount, 10 mil (Bt)
09	Datasonde, experimental (Bt)
10	Datasonde, thin film loop mount, 10 mil (Bt)
11	Pulsed sonde, experimental
12-19	Unassigned
20	MK-1, MK-2, experimental (Rw)
21	MK-1 (Rw)
22	MK-2 (Rw)
23-29	Unassigned
30	Echosonde, ES64-B, experimental (Rw)
31	Echosonde, ES64-B (Rw)
32-34	Unassigned
35	DMN Sonde, thin wire
36	DMN Sonde, flat plate
37-44	Unassigned
45	U.K. rocketsonde MK-11 spiralized coiled 13 $\mu$ m resistance wire element
46-49	Unassigned
	50-54 Sphere
50	Sphere, experimental
51	Sphere, inflatable
52-54	Unassigned
	55-59 Grenade
55	Grenade, experimental
56	Grenade
57-59	Unassigned
	60-64 Density gage
60	Density gage, experimental
61-64	Unassigned
	65-69 Pressure gage
65	Pressure gage, experimental
66-69	Unassigned
	70-79 Remote sensing
70	Remote sensing, experimental
71-79	Unassigned

Note: When specifications indicating experimental equipment are reported, plain language remarks explaining the experimental nature of the equipment shall be added at the end of the coded report.

## 0-0w — Type of wind sensing equipment

Code figure	Type of wind sensing equipment
00	No wind sensor
	01-09 Chaff
01	Chaff, experimental
02	Chaff, metalized
03-09	Unassigned
	10-29 Parachute
10	Parachute, experimental
11	Parachute, 0.5 m to 3.5 m diameter
12	Parachute, 3.6 to 5.5 m diameter
13	Parachute, greater than 5.5 m diameter
14	Mesh decelerator, experimental
15-29	Unassigned
	30-49 Starute
30	Starute, experimental
31	Starute, 0.5 m to 3.5 m diameter
32	Starute, 3.6 m to 5.5 m diameter
33	Starute, greater than 5.5 m diameter
34-49	Unassigned
	50-54 Sphere
50	Sphere, experimental
51	Sphere, inflatable
52-54	Unassigned
	55-59 Grenade
55	Grenade, experimental
56-59	Unassigned
	60-64 Chemical trail
60	Chemical trail, experimental
61-64	Unassigned
	65-69 Meteor trail
65	Meteor trail, experimental
66-69	Unassigned
	70-79 Remote sensing
70	Remote sensing, experimental
71-79	Unassigned
	80-99 Unassigned

Note: When specifications indicating experimental equipment are reported, plain language remarks explaining the experimental nature of the equipment shall be added at the end of the coded report.

## Code 1600

## h — Height above ground of the base of the lowest cloud seen

Code figure	
0	0 to 50 m
1	50 to 100 m
2	100 to 200 m
3	200 to 300 m
4	300 to 600 m
5	600 to 1000 m
6	1000 to 1500 m
7	1500 to 2000 m
8	2000 to 2500 m
9	2500 m or more, or no clouds
/	Height of base of cloud not known or base of clouds at a level lower and tops at a level higher than that of the station

## Notes:

- (1) A height exactly equal to one of the values at the ends of the ranges is to be coded in the higher range; e.g., a height of 600 m is reported by code figure 5.
- (2) The term "height above ground" is considered as being the height above the official aerodrome elevation or above station level at a non-aerodrome station.

### Code 1677

$h_c, h_a$  — Height of base of cloud layer or mass whose genus is indicated by C

Code Figure	Metres	Code Figure	Metres	Code Figure	Metres
00	< 30				
01	30	34	1 020	67	5 100
02	60	35	1 050	68	5 400
03	90	36	1 080	69	5 700
04	120	37	1 110	70	6 000
05	150	38	1 140	71	6 300
06	180	39	1 170	72	6 600
07	210	40	1 200	73	6 900
08	240	41	1 230	74	7 200
09	270	42	1 260	75	7 500
10	300	43	1 290	76	7 800
11	330	44	1 320	77	8 100
12	360	45	1 350	78	8 400
13	390	46	1 380	79	8 700
14	420	47	1 410	80	9 000
15	450	48	1 440	81	10 500
16	480	49	1 470	82	12 000
17	510	50	1 500	83	13 500
18	540	51	Not used	84	15 000
19	570	52		85	16 500
20	600	53		86	18 000
21	630	54		87	19 500
22	660	55		88	21 000
23	690	56	1 800	89	> 21 000
24	720	57	2 100	90	Less than 50 m
25	750	58	2 400	91	50 to 100 m
26	780	59	2 700	92	100 to 200 m
27	810	60	3 000	93	200 to 300 m
28	840	61	3 300	94	300 to 600 m
29	870	62	3 600	95	600 to 1 000 m
30	900	63	3 900	96	1 000 to 1 500 m
31	930	64	4 200	97	1 500 to 2 000 m
32	960	65	4 500	98	2 000 to 2 500 m
33	990	66	4 800	99	2 500 m or more, or no clouds

Note: If the observed value is between two of the reportable values as given in the table, the code figure for the lower reportable value is reported, except for code figures 90-99; in this decade, a value exactly equal to one of the values at the ends of the ranges is to be coded in the higher range; e.g., a height of 600 m is reported by code figure 95.

### Code 1751

$I_s$  — Ice accretion on ships

Code Figure	
1	Icing from ocean spray
2	Icing from fog
3	Icing from spray and fog
4	Icify from rain
5	Icing from spray and rain

### Code 1855

$I_w$  — Wind indicator

Code Figure		
0	Wind speed estimated	} wind speed in metres per second
1	Wind speed obtained from anemometer	
2	Wind speed estimated	} wind speed in knots
4	Wind speed obtained from anemometer	

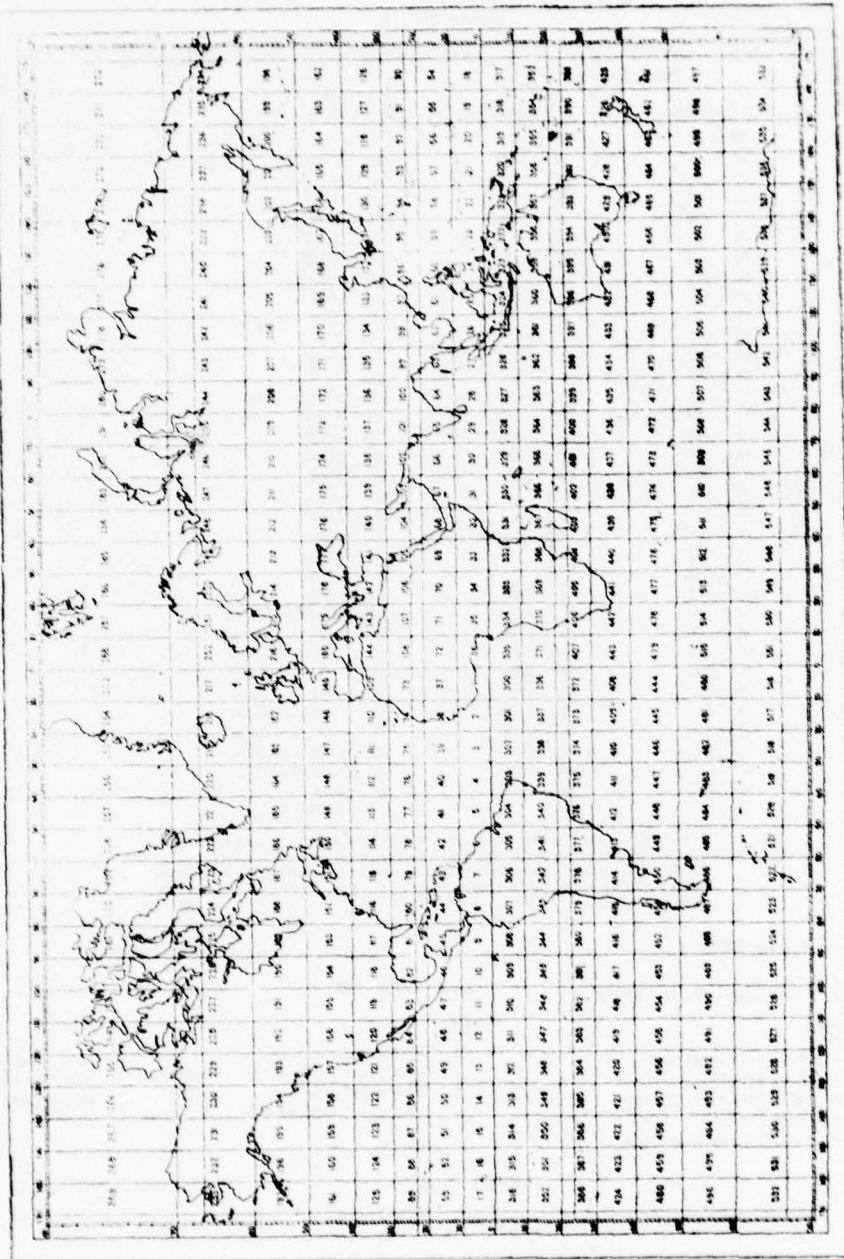
### Code 2100

K — Effect of the ice on navigation

Code Figure	
0	Navigation unobstructed
1	Navigation unobstructed for steamers, difficult for sailing ships
2	Navigation difficult for low-powered steamers, closed to sailing ships
3	Navigation possible only for powerful steamers
4	Navigation possible only for steamers constructed to withstand ice pressure
5	Navigation possible with the assistance of ice-breakers
6	Channel open in the solid ice
7	Navigation temporarily closed
8	Navigation closed
9	Navigation conditions unknown, e.g., owing to bad weather



MMM — Number of Marsden square in which the station is situated at the time of observation



Note: For polar zones, see following page

MMM

CODE TABLES

Code table 2500 — continuing

# ANNEX

## Subdivisions of the Marsden ten-degree squares into one-degree squares for the eight octants (Q) of the globe

WEST

EAST

90	00	01	02	03	04	05	06	07	08	09
80										80
70										70
60										60
50										50
40										40
30										30
20										20
10										10
00	00	01	02	03	04	05	06	07	08	09

90	01	02	03	04	05	06	07	08	09	
80										80
70										70
60										60
50										50
40										40
30										30
20										20
10										10
00	01	02	03	04	05	06	07	08	09	

NORTH

Q<sub>c</sub> = 7

Q<sub>c</sub> = 1

00	00	01	02	03	04	05	06	07	08	09
10										10
20										20
30										30
40										40
50										50
60										60
70										70
80										80
90	00	01	02	03	04	05	06	07	08	09

00	01	02	03	04	05	06	07	08	09	
10										10
20										20
30										30
40										40
50										50
60										60
70										70
80										80
90	01	02	03	04	05	06	07	08	09	

SOUTH

Q<sub>c</sub> = 5

Q<sub>c</sub> = 3

2649

m<sub>r</sub> — Method of reducing data

Code figure

- 1 Manually — Nomogram
- 2 Electronic computer
- 3 Other method

Note: Code figure 1 shall be reported if all, or any portion, of the data reduction was manual. Code figure 2 shall be reported only when all the data reduction was by electronic computer.

2700

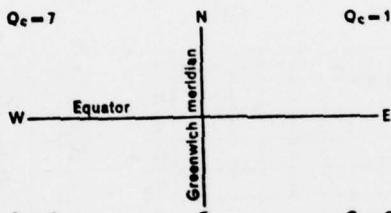
- N** — Total cloud cover  
**N<sub>h</sub>** — Amount of all the C<sub>L</sub> cloud(s) present or, if no C<sub>L</sub> cloud is present, the amount of all the C<sub>M</sub> cloud(s) present  
**N<sub>s</sub>** — Amount of individual cloud layer or mass, of genus C or CC  
**N'** — Amount of cloud the base of which is below the level of the land station

Code figure		
0	0	0
1	1 okta or less, but not zero	$\frac{1}{16}$ or less, but not zero
2	2 oktas	$\frac{2}{16} - \frac{3}{16}$
3	3 oktas	$\frac{4}{16}$
4	4 oktas	$\frac{5}{16}$
5	5 oktas	$\frac{6}{16}$
6	6 oktas	$\frac{7}{16} - \frac{8}{16}$
7	7 oktas or more, but not 8 oktas	$\frac{9}{16}$ or more, but not $\frac{10}{16}$
8	8 oktas	$\frac{11}{16}$
9	Sky obscured, or cloud amount cannot be estimated	

### Code 3333

**Q<sub>c</sub>** — Quadrant of the globe

Code figure	Latitude	Longitude
1	North	East
3	South	East
5	South	West
7	North	West



**Note:** The choice is left to the observer in the following cases:

- When the ship is on the Greenwich meridian or the 180th meridian (L<sub>0</sub>L<sub>0</sub>L<sub>0</sub>L<sub>0</sub> = 0000 or 1800 respectively):  
**Q<sub>c</sub>** = 1 or 7 (northern hemisphere) or  
**Q<sub>c</sub>** = 3 or 5 (southern hemisphere);
- When the ship is on the Equator (L<sub>0</sub>L<sub>0</sub>L<sub>0</sub> = 000):  
**Q<sub>c</sub>** = 1 or 3 (eastern longitude) or  
**Q<sub>c</sub>** = 5 or 7 (western longitude).

### Code 3551

**R<sub>s</sub>** — Rate of ice accretion on ships

Code figure	
0	Ice not building up
1	Ice building up slowly
2	Ice building up rapidly
3	Ice melting or breaking up slowly
4	Ice melting or breaking up rapidly

### Code 3600

**r** — Distance to ice edge from reporting ship

Code figure		
0	Up to 1 mile	Up to 2 kilometres
1	1 - 2 miles	2 - 4 kilometres
2	2 - 4 miles	4 - 7 kilometres
3	4 - 6 miles	7 - 11 kilometres
4	6 - 8 miles	11 - 15 kilometres
5	8 - 12 miles	15 - 22 kilometres
6	12 - 16 miles	22 - 30 kilometres
7	16 - 20 miles	30 - 37 kilometres
8	More than 20 miles	More than 37 kilometres
9	Unspecified, or no observation	Unspecified, or no observation

**Note:** The exact bounding distance is to be assigned to the lower code figure in each case; e.g., a distance of 8 miles or 15 kilometres is coded as 4.

3644

*r<sub>m</sub> — Type of rocket motor*

Code figure	
0	114 mm (4.5 in.), end burning
1	76 mm (3.0 in.), internal burning
2	Boosted, 114 mm (4.5 in.), end burning
3	Boosted, 76 mm (3.0 in.), internal burning
4	135 mm (5.3 in.), internal burning
5	180 mm (6.3 in.), internal burning

3700

*S — State of sea*

Code figure	Descriptive terms	Height * in metres
0	Calm (glassy)	0
1	Calm (rippled)	0 - 0.1
2	Smooth (wavelets)	0.1 - 0.5
3	Slight	0.5 - 1.25
4	Moderate	1.25 - 2.5
5	Rough	2.5 - 4
6	Very rough	4 - 6
7	High	6 - 9
8	Very high	9 - 14
9	Phenomenal	Over 14

**Notes:**

- (1) \* These values refer to well-developed wind waves of the open sea. While priority shall be given to the descriptive terms, these height values may be used for guidance by the observer when reporting the total state of agitation of the sea resulting from various factors such as wind, swell, currents, angle between swell and wind, etc.
- (2) The exact bounding height shall be assigned for the lower code figure; e.g., a height of 4 metres is coded as 5.

3738

*S<sub>n</sub> — Indicator showing type of temperature and height data*

Code figure	
0	Observed air temperature — D-value positive
2	Observed air temperature — D-value negative
4	Observed air temperature — no D-value reported
6	Air temperature reduced to the nearest standard isobaric surface. Height reduced to the nearest standard isobaric surface

Code 3800

*s — Depth of snow*

Code figure		Code figure	
0	No snow	5	Up to 25 cm
1	Up to 2 cm	6	Up to 50 cm
2	Up to 5 cm	7	Up to 100 cm
3	Up to 10 cm	8	Up to 200 cm
4	Up to 15 cm	9	200 cm or more



### Code 4451

- V<sub>a</sub>* — Ship's average speed made good during the three hours preceding the time of observation  
 — Distance of resultant ship's displacement during the three hours preceding the time of observation

Code Figure		
0	0 knot	0 kilometre per hour
1	1 - 5 knots	1 - 10 kilometres per hour
2	6 - 10 knots	11 - 19 kilometres per hour
3	11 - 15 knots	20 - 28 kilometres per hour
4	16 - 20 knots	29 - 37 kilometres per hour
5	21 - 25 knots	38 - 47 kilometres per hour
6	26 - 30 knots	48 - 56 kilometres per hour
7	31 - 35 knots	57 - 65 kilometres per hour
8	36 - 40 knots	66 - 75 kilometres per hour
9	Over 40 knots	Over 75 kilometres per hour

### Code 4500

*W* — Past weather

Code Figure	
0	Cloud covering $\frac{1}{4}$ or less of the sky throughout the appropriate period
1	Cloud covering more than $\frac{1}{4}$ of the sky during part of the appropriate period and covering $\frac{1}{4}$ or less during part of the period
2	Cloud covering more than $\frac{1}{4}$ of the sky throughout the appropriate period
3	Sandstorm, duststorm or blowing snow
4	Fog or ice fog or thick haze
5	Drizzle
6	Rain
7	Snow, or rain and snow mixed
8	Shower(s)
9	Thunderstorm(s) with or without precipitation

#### Notes :

- (1) In the case of a sandstorm, with a temperature below 0°C, the word SANDSTORM is added at the end of the report.
- (2) In the case of a shower or a thunderstorm, accompanied by hail, the words PAST HAIL are added at the end of the report.
- (3) In the case of a snow shower or a shower of rain and snow mixed, with a temperature above 0°C, the word SNOW or SLEET is added at the end of the report.

### Code 4663

*W<sub>2</sub>* — Indication of the element forming the principal object of a report of deterioration or improvement of the weather or for the taking of a special weather report from a ship

Code Figure	
0	Gusts
1	Wind (either wind direction or speed, or both)
2	Visibility
3	Cloud (amount or height)
4	Precipitation
5	Pressure
6	State of sea or of swell, i.e., waves
7	Duststorm, sandstorm or blowing snow
8	Thunderstorm (with or without precipitation)
9	Squall or tornado

# Code 4677

## ww — Present weather

ww — 00 — 49 No precipitation at the station at the time of observation

ww — 00 — 19 No precipitation, fog, ice fog (except for 11 and 12), duststorm, sandstorm, drifting or blowing snow at the station \* at the time of observation or, except for 09 and 17, during the preceding hour

### Code figure

ww	
No meteors except photometers	00 Cloud development not observed or not observable
	01 Clouds generally dissolving or becoming less developed
	02 State of sky on the whole unchanged
	03 Clouds generally forming or developing
Haze, dust, sand or smoke	04 Visibility reduced by smoke, e.g., veidt or forest fires, industrial smoke or volcanic ashes
	05 Haze
	06 Widespread dust in suspension in the air, not raised by wind at or near the station at the time of observation
	07 Dust or sand raised by wind at or near the station at the time of observation, but no well-developed dust whirl(s) or sand whirl(s), and no duststorm or sandstorm seen; or, in the case of ships, blowing spray at the station
	08 Well-developed dust whirl(s) or sand whirl(s) seen at or near the station during the preceding hour or at the time of observation, but no duststorm or sandstorm
	09 Duststorm or sandstorm within sight at the time of observation, or at the station during the preceding hour
	10 Mist
	11 Patches of shallow fog or ice fog at the station, whether on land or
	12 More or less continuous sea, not deeper than about 2 metres on land or 10 metres at sea
	13 Lightning visible, no thunder heard
	14 Precipitation within sight, not reaching the ground or the surface of the sea
	15 Precipitation within sight, reaching the ground or the surface of the sea, but distant, i.e., estimated to be more than 5 km, from the station
	16 Precipitation within sight, reaching the ground or the surface of the sea, near to, but not at the station
	17 Thunderstorm, but no precipitation at the time of observation
	18 Squalls at or within sight of the station during the preceding hour or at the time of observation
	19 Funnel cloud(s) **

\* The expression "at the station" refers to a land station or a ship.  
 \*\* Tornado cloud or waterspout.

(Code 4677 — continued)

ww = 20 - 29 Precipitation, fog, ice fog or thunderstorm at the station during the preceding hour but not at the time of observation

Code figure

ww

20	Drizzle (not freezing) or snow grains	} not falling as shower(s)
21	Rain (not freezing)	
22	Snow	
23	Rain and snow or ice pellets, type (a)	
24	Freezing drizzle or freezing rain	
25	Shower(s) of rain	
26	Shower(s) of snow, or of rain and snow	
27	Shower(s) of hail*, or of rain and hail*	
28	Fog or ice fog	
29	Thunderstorm (with or without precipitation)	

\* Hail, ice pellets, type (b), snow pellets. French: grêle, grésil ou neige roulée.

ww = 30 - 39 Duststorm, sandstorm, drifting or blowing snow

ww

30		- has decreased during the preceding hour
31	Slight or moderate duststorm or sandstorm	- no appreciable change during the preceding hour
32		- has begun or has increased during the preceding hour
33		- has decreased during the preceding hour
34	Severe duststorm or sandstorm	- no appreciable change during the preceding hour
35		- has begun or has increased during the preceding hour
36	Slight or moderate drifting snow	} generally low (below eye level)
37	Heavy drifting snow	
38	Slight or moderate blowing snow	} generally high (above eye level)
39	Heavy blowing snow	

ww = 40 - 49 Fog or ice fog at the time of observation

ww

40	Fog or ice fog at a distance at the time of observation, but not at the station during the preceding hour, the fog or ice fog extending to a level above that of the observer	
41	Fog or ice fog in patches	
42	Fog or ice fog, sky visible	} has become thinner during the preceding hour
43	Fog or ice fog, sky invisible	

(continued)

(Code 4677 - continued)

Code figure

44	Fog or ice fog, sky visible	} no appreciable change during the preceding hour
45	Fog or ice fog, sky invisible	
46	Fog or ice fog, sky visible	} has begun or has become thicker during the preceding hour
47	Fog or ice fog, sky invisible	
48	Fog, depositing rime, sky visible	
49	Fog, depositing rime, sky invisible	

---

ww = 50 - 99 Precipitation at the station at the time of observation

---

ww = 50 - 59 Drizzle

---

ww		
50	Drizzle, not freezing, intermittent	} slight at time of observation
51	Drizzle, not freezing, continuous	
52	Drizzle, not freezing, intermittent	} moderate at time of observation
53	Drizzle, not freezing, continuous	
54	Drizzle, not freezing, intermittent	} heavy (dense) at time of observation
55	Drizzle, not freezing, continuous	
56	Drizzle, freezing, slight	
57	Drizzle, freezing, moderate or heavy (dense)	
58	Drizzle and rain, slight	
59	Drizzle and rain, moderate or heavy	

---

ww = 60 - 69 Rain

---

ww		
60	Rain, not freezing, intermittent	} slight at time of observation
61	Rain, not freezing, continuous	
62	Rain, not freezing, intermittent	} moderate at time of observation
63	Rain, not freezing, continuous	
64	Rain, not freezing, intermittent	} heavy at time of observation
65	Rain, not freezing, continuous	
66	Rain, freezing, slight	
67	Rain, freezing, moderate or heavy	
68	Rain or drizzle and snow, slight	
69	Rain or drizzle and snow, moderate or heavy	

---

ww = 70 - 79 Solid precipitation not in showers

---

ww		
70	Intermittent fall of snowflakes	} slight at time of observation
71	Continuous fall of snowflakes	
72	Intermittent fall of snowflakes	} moderate at time of observation
73	Continuous fall of snowflakes	



(Code 4677 — continued)

Code figure

- |    |                                                        |                                |
|----|--------------------------------------------------------|--------------------------------|
| 74 | Intermittent fall of snowflakes                        | } heavy at time of observation |
| 75 | Continuous fall of snowflakes                          |                                |
| 76 | Diamond dust (with or without fog)                     |                                |
| 77 | Snow grains (with or without fog)                      |                                |
| 78 | Isolated star-like snow crystals (with or without fog) |                                |
| 79 | Ice pellets, type (a)                                  |                                |

---

ww — 80-99 Showery precipitation, or precipitation with current or recent thunderstorm

---

ww

- |    |                                                                                                    |                                                                       |
|----|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| 80 | Rain shower(s), slight                                                                             |                                                                       |
| 81 | Rain shower(s), moderate or heavy                                                                  |                                                                       |
| 82 | Rain shower(s), violent                                                                            |                                                                       |
| 83 | Shower(s) of rain and snow mixed, slight                                                           |                                                                       |
| 84 | Shower(s) of rain and snow mixed, moderate or heavy                                                |                                                                       |
| 85 | Snow shower(s), slight                                                                             |                                                                       |
| 86 | Snow shower(s), moderate or heavy                                                                  |                                                                       |
| 87 | { Shower(s) of snow pellets or ice pellets, type (b), with or without rain or rain and snow mixed  | - slight                                                              |
| 88 | { Shower(s) of hail*, with or without rain or rain and snow mixed, not associated with thunder     | - moderate or heavy                                                   |
| 89 | { Shower(s) of hail*, with or without rain or rain and snow mixed, not associated with thunder     | - slight                                                              |
| 90 | { Shower(s) of hail*, with or without rain or rain and snow mixed, not associated with thunder     | - moderate or heavy                                                   |
| 91 | Slight rain at time of observation                                                                 |                                                                       |
| 92 | Moderate or heavy rain at time of observation                                                      |                                                                       |
| 93 | Slight snow, or rain and snow mixed or hail** at time of observation                               | thunderstorm during the preceding hour but not at time of observation |
| 94 | Moderate or heavy snow, or rain and snow mixed or hail** at time of observation                    |                                                                       |
| 95 | Thunderstorm, slight or moderate, without hail**, but with rain and/or snow at time of observation |                                                                       |
| 96 | Thunderstorm, slight or moderate, with hail** at time of observation                               |                                                                       |
| 97 | Thunderstorm, heavy, without hail**, but with rain and/or snow at time of observation              | thunderstorm at time of observation                                   |
| 98 | Thunderstorm combined with dust-storm or sandstorm at time of observation                          |                                                                       |
| 99 | Thunderstorm, heavy, with hail** at time of observation                                            |                                                                       |

\* French: grêle.

\*\* Hail, ice pellets, type (b), snow pellets. French: grêle, grêlail ou neige roulée.

RECCO Codes\*

TABLE 4-1 Code  $c_e$

$c_e$ - Character of echo	
Code figure	
0	Not reported, or indeterminate
1	Scattered
2	Solid
3	Scattered line
4	Solid line
5	Scattered, all quadrants
6	Solid, all quadrants

TABLE 4-2 Code  $d_w$

$d_w$ - Bearing of distant weather	
Code figure	
0	No report
1	NE
2	E
3	SE
4	S
5	SW
6	W
7	NW
8	N
9	All directions

4-14

\* US Air Force, Air Weather Service, Meteorological Codes, AWSM 105-24, Vol. I, 1 September 1976.

TABLE 4-3 Code  $d_a$  $d_a$  - Reliability of wind at flight levelCode  
figure

0 90% to 100% reliable; multiple drift with closed wind star, or small open star when winds are 50 knots or greater; short radar wind runs; winds obtained using Doppler radar or inertial omega systems.

1 85% to 100% reliable; multiple drift with small open star, or double drift or single drift with average ground speed by timing; short radar wind runs.

2 80% to 100% reliable; fix to fix winds using the following pin point visual fixes, radar fixes or accurate loran fixes using good ground waves.

3 75% to 90% reliable; fix to fix winds using two or three lines of position (LOPs) either loran, celestial, radio or sight bearings or any combination of the three above when all lines of position are considered reliable.

4 60% to 80% reliable; winds obtained using single drift and single LOP (Speed Line), air plot, etc.

5 50% to 75% reliable; fix to fix winds using two or three lines of position either loran, celestial, radio or sight bearings or any combination of the above when one of the lines is not considered reliable.

6 Less than 50% reliable; winds obtained by any of the above methods which the navigator believes to be inaccurate or of questionable accuracy.

7 No reliability; assumed or estimated winds.

8 No wind; navigator unable to determine a wind.

TABLE 4-7 Code  $I_t$  $I_t$  - Type of icing and type of contrailsCode  
figure

0 None.

1 Rime ice in cloud.

2 Clear ice in cloud.

3 Combination rime and clear ice in cloud.

4 Rime ice in precipitation.

5 Clear ice in precipitation.

6 Combination rime and clear ice in precipitation.

7 Frost (icing in clear air).

8 Non-persistent contrails (less than 1/4 nautical mile long).

9 Persistent contrails.

TABLE 4-9 Code *i<sub>e</sub>*

<i>i<sub>e</sub></i> - Intensity of echo	
Code figure	
0	No report, or unknown.
1	Weak, decreasing.
2	Weak, no change.
3	Weak, increasing.
4	Moderate, decreasing.
5	Moderate, no change.
6	Moderate, increasing.
7	Strong, decreasing.
8	Strong, no change.
9	Strong, increasing.

TABLE 4-11 Code *m<sub>w</sub>*

<i>m<sub>w</sub></i> - Remarks on present weather	
Code figure	
0	Light intermittent.
1	Light continuous.
2	Moderate intermittent.
3	Moderate continuous.
4	Heavy intermittent.
5	Heavy continuous.
6	With rain.
7	With snow.
8	With hail.
9	No remarks.



TABLE 4-12 Code  $O_e$ 

$O_e$ - Orientation of ellipse	
Code figure	
0	No report.
1	NNE - SSW.
2	NW - SW.
3	ENE - WSW.
4	E - W.
5	ESE - WNW.
6	SE - NW.
7	SSE - NNW.
8	S - N.
9	Uncertain.

TABLE 4-13 Code  $S_b$ ,  $S_e$ , and  $S_a$ 

$S_b$ - Distance to beginning of icing	
$S_e$ - Distance to ending of icing	
$S_a$ - Distance of occurrence of $W_s$	
Code figure	
0	No report.
1	Previous position.
2	Present position.
3	30 nautical miles.
4	60 nautical miles.
5	90 nautical miles.
6	120 nautical miles.
7	150 nautical miles.
8	180 nautical miles.
9	More than 180 nautical miles.
/	Unknown.

TABLE 4-15 Code W<sub>d</sub>

W <sub>d</sub> - Distant Weather	
Code figure	
0	No report.
1	Signs of hurricane.
2	Ugly, threatening sky.
3	Duststorm or sandstorm.
4	Fog or ice fog.
5	Waterspout.
6	Cirrostratus layer or bank.
7	Altostratus or Altocumulus layer or bank.
8	Line of heavy Cumulus.
9	Cumulonimbus heads or thunderstorm.

TABLE 4-16 Code W<sub>s</sub>

W <sub>s</sub> - Significant weather changes	
Code figure	
0	No change.
1	Marked wind shift.
2	Beginning or ending of marked turbulence.
3	Marked temperature change (not with altitude).
4	Precipitation begins or ends.
5	Change in cloud forms.
6	Fog or ice fog bank begins or ends.
7	Warm front.
8	Cold front.
9	Front, type not specified.

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Because of the limited applicability of the material in this Technical Note to general AWS detachment use, the distribution has been limited to the above list. Additional copies may be obtained from USAFETAC/CBT, Scott AFB, IL 62225.

## LIST OF USAFETAC TECHNICAL NOTES

<u>Number</u>	<u>Title</u>	<u>Date</u>
74-1	Atmospheric Moisture Parameterization (AD-784814)	Jan 74
74-2	Development of a Gridded Data Base (AD-A056234)	Apr 74
74-3	A Precipitating Convective Cloud Model (AD-A002117)	May 74
74-4	A Synoptic-Scale Model for Simulating Condensed Atmospheric Moisture (AD-A002118)	Jun 74
75-1	Estimated Improvement in Forecasts of the SANEAR Hurricane Model Using the Airborne Weather Reconnaissance System (AD-A004097)	Jan 75
75-2	Spring Weather Patterns of the Western United States (Reprints) (AD-A006691)	Mar 75
75-3	Summer Weather Patterns of the Western United States (Reprints) (AD-A009860)	May 75
75-4	Autumn Weather Patterns of the Western United States (Reprints) (AD-A013801)	Jul 75
75-5	Winter Weather Patterns of the Western United States (Reprints) (AD-A057745)	Sep 75
76-1	(Number not used)	
76-2	Some Aspects of Estimating the Probability of Cloud-Free Lines-of-Sight in Dynamic Situations	Mar 76
76-3	Model Output Statistics Forecast Guidance (AD-A037148)	Sep 76
77-1	Listings of Seminars Available from Hq AWS, AWS Wings, and AFGWC	Mar 77
77-2	USAFETAC Data Base Handbook (AD-A )	Dec 77



A black and white photograph of a film strip, likely from a Super 8 camera, with the text 'END DATE FILMED 2-79' overlaid in white. The film strip is coiled and runs diagonally across the frame. The text is in a bold, sans-serif font, with 'END' on the first line, 'DATE' on the second, 'FILMED' on the third, and '2-79' on the fourth. The background is black, and the film strip is a light gray color.

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